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ABSTRACT

This thesis focuses on the definitional and cross-cultural processes involved in the development of an environmental education (EE) database of essential learnings, and the potential of the product in improving the effectiveness of international EE. Identifying the universal aspects of EE is crucial because EE is an evolving field, and is international in scope and development. Many nations are instituting programs in EE and there are several multinational efforts underway. For nations to effectively work together, and for new environmental educators to avoid needless repetition, universal EE definitions are needed. The database analyzed is a combination of two parts: concepts and processes. It consists of over 630 entries coded by subject, educational level, objective, and type of content. Cross-cultural compilation and reviews by Indian and US environmental professionals were included in this definitional process. Included is a statement of the problem, a case study and analysis of the "Essential Learnings" database, and conclusions and recommendations. (Author/CW)

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Defining the Universal in International Environmental Education through a Content Database

by
Melissa Ballard

A thesis submitted in partial fulfillment
for the Master's of Science degree

State University of New York, College of
Environmental Science and Forestry

February, 1989

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For that great intangible, encouragement, affection and best wishes for their endeavors to my family and friends.

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Abstract

The thesis focuses on the definitional and cross-cultural processes engaged during the development of an environmental education (EE) database, and the universal potential of the product in improving the effectiveness of international EE. Identifying the universal aspects of EE is crucial because EE is an evolving field, rapidly becoming international in scope and development. Many nations are instituting new programs in EE, and there are many efforts underway with multi-national involvement. For nations to work together effectively, and for new environmental educators to avoid "re-inventing the wheel", those elements of EE that are universal need definition.

In the past, EE programs and curricula have been devised to follow concept bases -- established domains of EE content, and written goals and philosophies -- established EE process. The database analyzed here is a combination of these two approaches. It consists of 630+ entries coded by subject, educational level, educational objective, and type of content. Cross-cultural compilation and review by Indian and US environmental professionals was also a component of the definintional process.

Analysis of this database illustrates some universal characteristics of EE. It is also illustrates that this approach has resulted in a largely universal document, one that can be used to build both effective wide-ranging international programs, and to meet specific EE needs.

KEY WORDS
International, Environmental Education, Cross-cultural, Instructional Design

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Chapter 1
Lack of Definition Limits Effectiveness of International Environmental Education

International EE

Environmental issues are international issues: radioactivity in the atmosphere, and toxins in oceans do not recognize national boundaries. Further, it is now apparent that environmental damage is occurring on a global scale (e.g., deforestation's effects on climate, the greenhouse effect, the ozone hole, Chernobyl).

Clearly there is a vast need to communicate about environmental issues on a global scale, to minimize and reverse this damage. Environmental education (EE) is a vehicle which seeks to achieve this through changed awareness, knowledge, attitudes and behavior towards the environment.

EE's international outlook is expressed in the widely accepted Tblisi definition. The Tblisi definition, so named as it was written during the 1977 UNESCO conference on EE in Tblisi, Russia, describes EE's goal as:

> *"To develop a world population that is aware of, and concerned about the total environment, and its associated problems, and which has the knowledge, attitudes, motivation, commitment, and skills to work individually and collectively toward the solution of current problems and the prevention of new ones."* [1]

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[1] Stapp. p.1. This definition is a focal point of much EE discourse, and as such may be found in many EE references.

This fundamental principle of EE, a global perspective, is gaining wider expression as the frailty and limits of our biosphere become common knowledge. The 1980s have seen the initiation of programs with comprehensive global scope and of national outreach, such as the "State of the World" TV series.[2] Also, there is a trend toward introducing international divisions in traditionally domestic environmental organizations (e.g., Audubon, the Nature Conservancy, National Wildlife Federation). Individuals are also recognizing the limitations of their regional environmental programs. A US Senator from Ohio who is supporting biodiversity funds for South American rainforests, said he did so, "To protect our Ohio summer songbirds."[3]

With this growing awareness of global interdependency, there is growth in EE programs both of international focus * (their content emphasizes international aspects of environmental issues), and function (they are joint efforts between nations). New EE approaches and materials are in constant demand. Those rushing to meet this demand, however, are met by the existing, somewhat ethereal, definition of EE.[4]

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[2] This series is an adaptation of the Worldwatch Institute annual report of the same name, and will consist of ten one-hour films, to be broadcast nationally on PBS in 1990. It is being produced through a joint Indian, Australian, US coalition at Chedd Anglers/WGBH in Boston, MA.

[3] Saterson, Katherine. US AID natural resources/biodiversity officer. Personal conversation, July 1988.

[4] Definition here meaning not a few lines but a general blueprint as to the directions in which the field of EE should be developed.

EE's Definitional Problem

EE definition a first step in EE universality

Definition of EE is required because, as environmental educators Helgerson et al expressed:

> "The need for a framework for thinking about environmental problems seems clear. ...it is absolutely essential that any problem area that is to be seriously studied, be limited in scope..." [5]

To be effective, therefore, environmental educators require specification of what it is that they will teach when they teach environmental education. Further, if EE is to be effective internationally, this framework must be clarified in the context of being equally applicable to all audiences. For, ideally, EE will be able to cross boundaries -- be universal. It will reach the corners of the globe through people, as efficiently as pollution moves through air, water and land.

To increase the effectiveness of EE, then universal aspects of the framework should be identified and EE programs built from this base. Definition is a familiar process through which environmental educators focus their efforts. The focus of this thesis is to increase the effectiveness of international EE by first defining EE, and then identifying the universal aspects of the field as expressed within the definition.

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[5] Disinger's 1983 treatise, "Environmental Education's Definitional Problem." p. 3

The definition as two-pronged

Environmental educators differ as to whether or not EE requires precise and unequivocal definition.[6] But definition does not have to be an endless, tedious task; an accurate EE definition may be developed by attention to two approaches, the definition of EE process, and the definition of EE content. Both of these approaches will be utilized in developing this international definition.

In the early 1970s, Walter Bogan, Director of the US Office of Environmental Education, cited the definitional problem of EE as slowing the flow of grants from his office. In the requests passing across his desk, he discerned two working definitions of EE: 1.) those that emphasized process and 2.) those that emphasized content.[7]

The definition of process has been satisfactorily pursued in EE literature, e.g. the Tblisi definition (see page 1). Tblisi is a process definition because it defines environmental education as an interactive process. It emphasizes a movement; taking students from awareness through a foundation of knowledge about the environment, to changed attitudes, and ultimately to participation in environmental problem-solving. In the movement of its objectives along this continuum from cognitive gains to affective change to actual change in behavior, this definition describes successful environmental education as a change agent.[8]

Tblisi is an over-arching goal, and a description of the EE process. It does not attempt to provide detail as to EE content. In this way it is limited, and stops short of addressing the second prong of EE definition, *what to include as content?*

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[6] Ibid.

[7] Bogan p. 2.

[8] Hanselman, personal conversation.

Three factors affect content definition

Universal agreement on essential EE content remains elusive due to three factors: diverse origins, rapid evolution, and multi-cultural perception of environmental problems and solutions. (Diagram 1)

The diversity of activities and materials labeled EE make it difficult for a new EE initiative to know which materials and approaches are appropriate. Live snake shows, writing letters to Congressmen, conferences for environmental professionals, and measuring the biological oxygen demand of a stream, may all be described as EE. In addition, in formal education, EE is interdisciplinary and as such is not neatly pigeon-holed like "biology," "algebra," or "history."

Diverse origins are responsible in part for the diversity of programs labeled EE. It is generally agreed that in the US, EE emerged from the earlier disciplines of nature study, outdoor education, and conservation education.[9] These environmental education approaches began to merge in the 1950s. Two decades later they emerged as a combination of nature study, conservation education, and the instructional approaches from outdoor education and other teaching methodologies -- welded into the strong ecological cast that continues to characterize EE today. Although held in common by this ecological bond, divisions in EE exist so that both the outdoor educator and a person writing environmental software, may today both be considered representative of EE.

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[9] Swan, Malcolm. As included in McGinnis and Albrecht, p. 18.

FACTORS AFFECTING EE DEFINITION

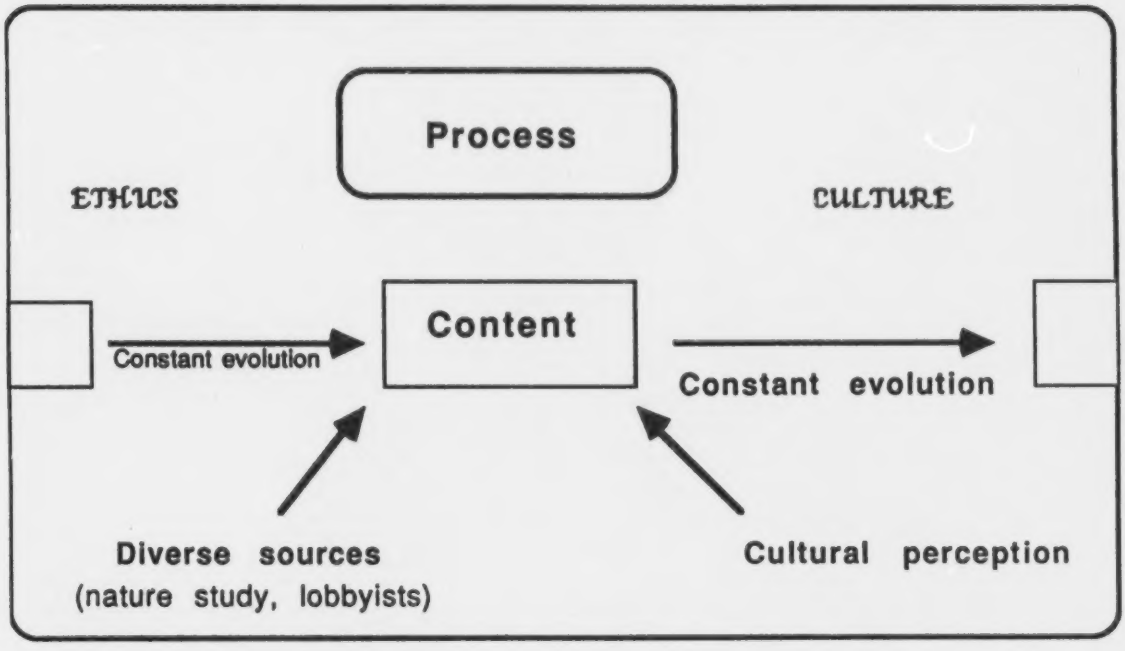

DIAGRAM 1

Approaches to problem-solving also seem to be changing. Just as the early emphasis on technical solutions gave way to an emphasis on an often vague 'public involvement,' 'community involvement' seems to be increasing -- even to be mandated.[13] This is *community* in the context of those associated with a particular issue, as well as the global community of the slogan, "Think globally, act locally." [14]

Past	1969	Present
Resource-centered	Anthro-centered	Bio-centric
Technological impetus	Public involvement	Community involvement

Possible Change in EE's Content since 1969

Why does EE content constantly change? It is because education is a reflection of current societal values. The continuing change in EE is in part a response to the concurrent growth of our environmental ethic. One well-spring of this expanding ethical vantage point, Aldo Leopold stated in 1948, "(we must) enlarge the boundaries of the (moral) community to include soils, waters, plants and animals, or collectively: the land."[15] One observer of this process, Roderick Nash, a professor of environmental studies at the University of California at Santa Barbara, proposes an illustration of human ethical evolution, with an initial broad base of environmental ethics that narrows as capitalism becomes prevalent, resulting in an

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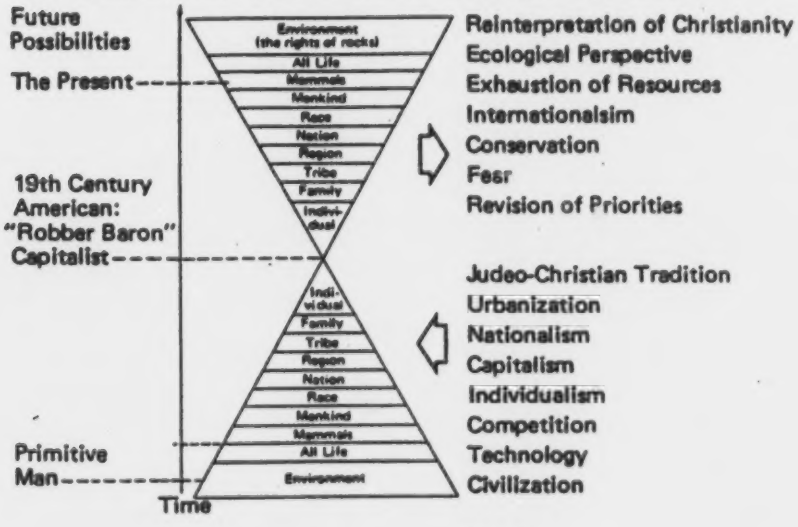
[13] The 1983 amendments to the Federal Superfund legislation, Superfund Act Reauthorization Amendment (SARA) which includes a mandate for community participation is one example of this trend.

[14] Stapp

[15] Leopold. A Sand County Almanac, p. vii - ix.

ethical dilution that over-rides a fundamental cultural theme world-wide -- restraint on resource use. As the pyramid broadens, our environmental values broaden, as the limits of our resource base are perceived.[16]

THE DECLINE AND RECOVERY OF ETHICAL PERSPECTIVE



Nash

This illustration indicates that environmental ethics are not static. Changes in EE content then are in part a reflection of a continuing ethical trend. The trend may or may not be towards a land ethic, or upward as Nash presents. But, defining EE content becomes defining a moving target, and therefore, difficult.

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16 Nash p. 46 This device has its limitations. In reflecting the values of a generic Western industrialized society, this pyramid does not reflect those cultural groups whose environmental values have always remained broad-based, such as Australian Aborigines, or of differences between different economic systems. Levels within these Western capitalistic systems are also unrepresented -- some are further advanced in their conservation ethics than others.

Multi-cultural perception a key to definition

Another descriptor of EE content has been its reflection of the Western industrialized societies in which it emerged (concern over littering, aesthetics). This has incurred a further definitional problem, as the growing internationality of the field has resulted in more EE projects between nations. It introduces a new factor -- cultural perception of environmental problems and their solutions. Failure to resolve this aspect of EE definition has resulted in the varied success of many international efforts.

In EE between countries that are culturally and economically disparate, often the roots of environmental problems, or the means by which they may be resolved, differ to the extent that Western interpretations are not transferable. Therefore, even the best intentions in technology transfer, educational or otherwise, must be viewed critically.[17] Host countries often criticize environmental educators from overseas for using ideas and approaches inappropriate to the project at hand. People living in regions in need of erosion control, for example, don't need to be handed packets of glossy bird guides, even if they were "just the thing back home." This is an issue of effectiveness: many educators feel education is effective only when what goes on in schools reflects local culture, and addresses local concerns.[18]

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[17] McCrea and Wood, p. 10
[18] Knamiller, p. 7.

A Case Study in Defining EE for International Use offers Basis for Thesis

Past difficulties in international EE were a concern of one new EE initiative, a joint Indian/US project, of which this thesis is a by-product. This project, the Children's Environmental Education Television Project (CEETV), is developing environmental education modules for broadcast on Indian television, and for use in Indian middle school classrooms.[19] Appendix A contains details on this case studies origins, institutions, and directions.

Before working together, the Indian and US sides of the project felt it imperative to define EE content within the scope and context of India -- to avoid the history of misinterpretion. They felt that EE is, or should be, specific to each audience. Furthermore it was expressed that an approach to identifying Indian-specific Ee would be studying and understanding existing Indian EE approaches and content. Therefore, developing a comprehensive EE content framework was the first task of the project.[20]

The resulting database is called Essential Learnings in Environmental Education: A Handbook for Building Curricula. It contains 630+ entries, primarily concepts, learning objectives, definitions and points of view.[21] (See Appendix B -- blue book) Diagram 2 illustrates the role of this database in the CEETV project.[22]

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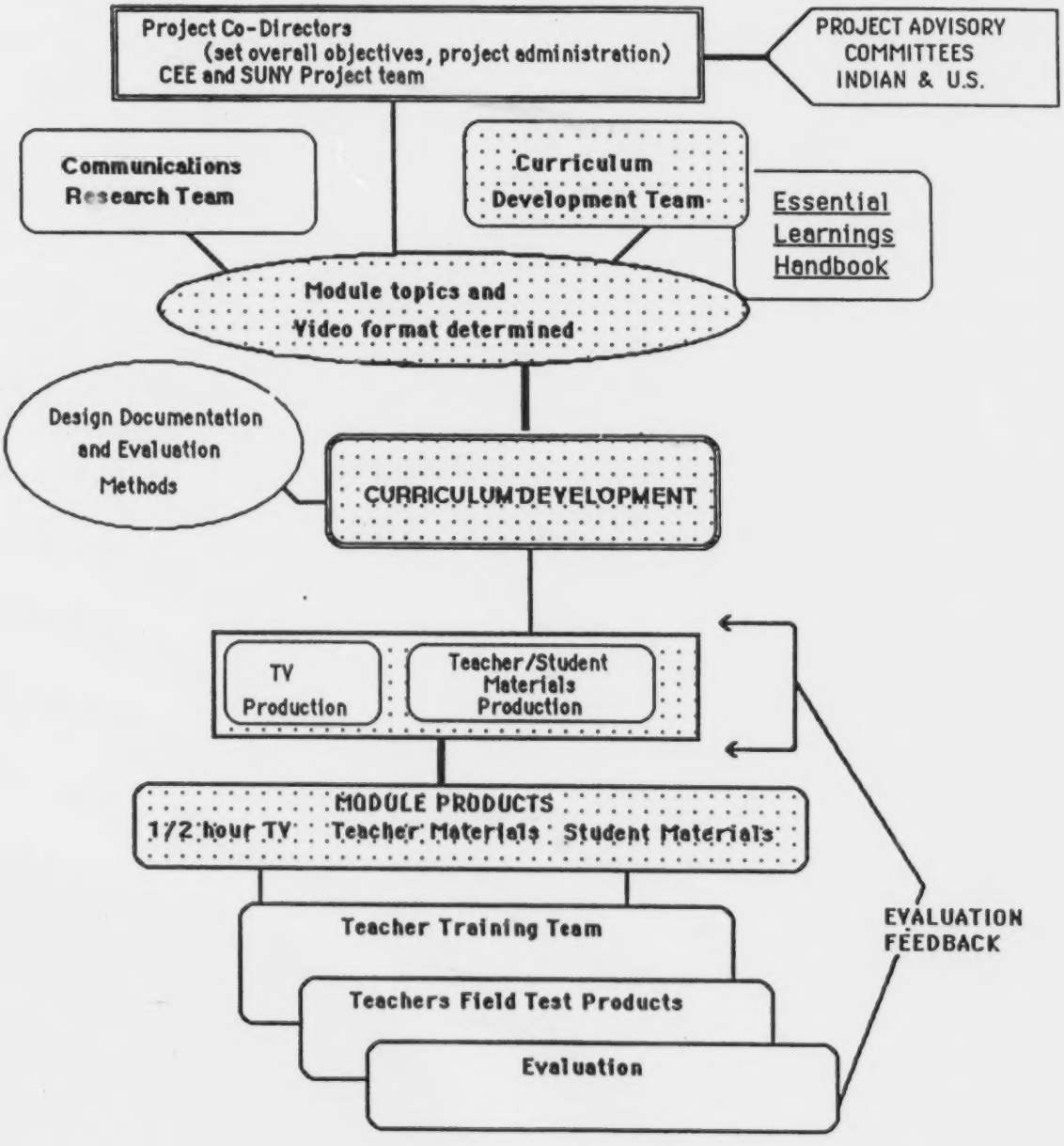
[19] The official title of the project is, "A United States and India joint effort to Further Environmental education in the Schools of India by Development and Use of Television Programming."

[20] CEETV. "The Effective Use of TV and Films in Environmental Education"

[21] The number of entries is given as 630+ because the final document is still being prepared. The final number of entries in this edition when completed, is expected to be 630+ or - 10.

[22] As the first US graduate student on the project, I took major responsibility for developing Essential Learnings from its origin at CESF to its final compilation at CEE. I initially worked directly with Dr. Hanselman designing the scheme and entering the first round of entries. His involvement in the database tapered thereafter into periodic

DIAGRAM 2 FUNCTIONS OF ESSENTIAL LEARNINGS WITHIN CEETV PROJECT 12



review. This thesis, an analysis of the Essential Learnings database with respect to the definition it offers of EE, is based on my initiative and effort.

To what extent was Essential Learnings warranted? What characterizes the EE of India? To answer this, the process and content of Indian EE will be briefly examined, to establish it as significantly different from, for example, American EE. This is important to distinguish as subsequent chapters discuss the universality of this Indian-derived EE.

Background of Indian EE

EE in India has been mandated nationally and the The Centre for Environment Education, (CEE) located in Ahmedabad, India was created to assume major responsibility for EE development and implementation in India. The Essential Learnings database, on which this thesis is based, was co-authored by CEE and its staff. EE is also flourishing in many non-government organizations and in individual communities across the subcontinent. (For example, the 1980 movement against the Silent Valley hydro-electric dam, in the southern state of Kerela, was led by a grassroots people's science organization.)

India places emphasis on EE for several reasons A primary reason is seventy-five percent of Indians live in rural areas, with their welfare directly dependent on the land and water surrounding them. Because of this, environmental issues are a matter of sustenance and survival for the majority of her people. As Ranjiv Gandhi said in his October, 1987 address to the UN Conference on Environment and Development, "It is the livelihood and hopes of the poor that....bear the brunt of environmental damage." [23]

Second, there is a growing middle class, that, as in Western nations, looks to the environment for its leisure. However, many previously undeveloped regions have been developed since independence in 1947. Industrialization has developed rapidly. The Green Revolution and other efforts to make India self-sustaining

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[23] Gandhi, R. p. 2.

have incurred environmental costs. Now there is reflection among this same leisure class as to the ecological effects of this headlong development. The environment is in the spotlight and, as a result, environmental legislation and awareness is on the increase.

EE content in India

The Indian public faces modern environmental problems, as well as the more traditional issues of an agrarian economy: issues range from toxic waste, to loss of soil fertility due to increased use of cow dung as cooking fuel. Traditional environmental relationships also influence EE. 'Environmental Protection' in India has always existed to some extent because of traditional cultural or religious resource use limitations.[24] Sacred groves and species, and the protection of the Raja's (and later the Britisher's) hunting lands, are among these traditional conservation influences. Today there is discussion of these traditional means, as well as the governmental setting aside of lands from the dual pressures of development and increasing populations.

EE process in India

EE process is an important element of environmental education in India. The Centre for Environment Education is concerned with EE process in its design of EE teacher-training programs. They found an initial difficulty in overcoming teachers' unfamiliarity with the discussions, games, and other forms of participation/discovery learning that are common in adapting EE approaches.[25] They have been able to solve this in part by leaving activities open-ended.

Outside of the classroom EE process faces other obstacles. Consider the difficulties an EE project might face, say in bringing video cameras to villagers for their documentation of drought

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[24] Krishnamurti. Chapter 10 India's Environment, Crises and Responses.

[25] Pandaya, Mamata. Personal conversation at CEE February, 1988.

conditions. A UN Food and Agriculture Organization (FAO) communication specialist, who brought video technology to some Indian villages, noted the difficulty he had was not in training local people in the use of the medium, but in overcoming local government's resistance. Local officials resented their circumvention as the villagers' sole communication source.[26]

Thesis Overview

This thesis consists of two parts. First, there is the criteria of EE definition and the methodology through which the EE database, Essential Learnings, compiled for the case study above, is said to offer a definition of EE (Chapters One and Three). Second, there is the criteria for EE universality and the methodology through which the universal elements of EE are analyzed (Chapters Two and Chapter Four).

Chapter Two details the basis and criteria for EE universality. Specifically it states that universal EE content is effective with all audiences, i.e. it is not culturally limited, while universal EE process is flexible in its change agent role. In addition, universal EE must be adaptable for use with various educational technologies. Educational television, as it was researched for the case study above, is used to illustrate this point.

Second, the methodology used to identify universal elements in Essential Learnings is described. Essential Learnings' process universality is represented by the flexible coding of the entries by educational level, educational objective, and by type of content. Cultural immersion on the part of this author in the culture of India, and extensive literature search of Indian and US EE is the

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[26] As quoted in McClellan p. 46.

basis for this author's analysis of content for applicability to EE outside of India.

Chapter Three outlines the process and methodology through which Essential Learnings establishes a definition of EE. Based on the two-pronged approach to EE definition, this author concluded that an accurate definition is based on the Tblisi definition, with close attention to EE's diverse origins, current literature, and differing cultural perceptions. For process, the Essential Learnings database used the Tblisi definition as its central goal. For content, pre-established concept bases and an extensive literature survey in India and the US was paired with an equally extensive review of completed entries by environmental scientists and educators in both countries. This chapter also includes examples of entries.

Chapter Four is two-tiered; it offers an analysis of the database's EE process definition based on entry coding, and presents results on the database's content universality by division of content into Indian, Developing World, and Universal categories. Graphs illustrate the percentages of entries coded into the categories listed above. These charts serve as an interpreter for Essential Learnings' universality and EE definition.

Second, chapter four describes the use of the process universality through instructional development, using the CEETV case study learning objectives as examples. Specific suggestions are made for identifying EE topics, core themes -- learnings which are basic to environmental education, writing primary and secondary learning objectives, and analytical use of the database to foresee intrinsically difficult topics such as heavily participation-oriented, highly issue-oriented, etc.

Chapter Five presents conclusions and recommendations for the database's universal applicability to ongoing and future EE efforts.

Chapter 2
A Case Study and a Database Analysis Lead to EE Universality

Chapter One stated that EE should be able to cross boundaries -- be universal, reaching the corners of the globe through people as efficiently as pollution moves through air, water and land. Unfortunately it is not. There is lack of clarify as to what is and what is not EE. There are cultural, economic, and political factors which often define which changes in environmental attitudes and behaviors are appropriate. Specifying EE universality can not erase all these problems, but this author believes defining a universal base is desirable given the global nature of environmental problems.

A US-Indian case study was used in Chapter One to illustrate that studying the culture of an audience is essential in defining EE for their use. Failure to do this, to make environmental education locally relevant, was cited as the downfall of some past international programs.

But in making EE culturally relevant, is it made culturally limited? To what extent must environmental educators redefine EE for a new audience? That is, is there universality in any EE definition --definitions, concepts, issues which could be a part of any program, whether taught an Indian suburban audience, subsistence farmers on a coral atoll, or a school child in Chicago? (Diagram 3 projects this hypothesized universality.)

If this universality exists how may it be distinguished? The parameters for identification of EE universality will be discussed first, followed by the methodology of its identification in this EE definition.

UNIVERSALITY IN EE DEFINITION

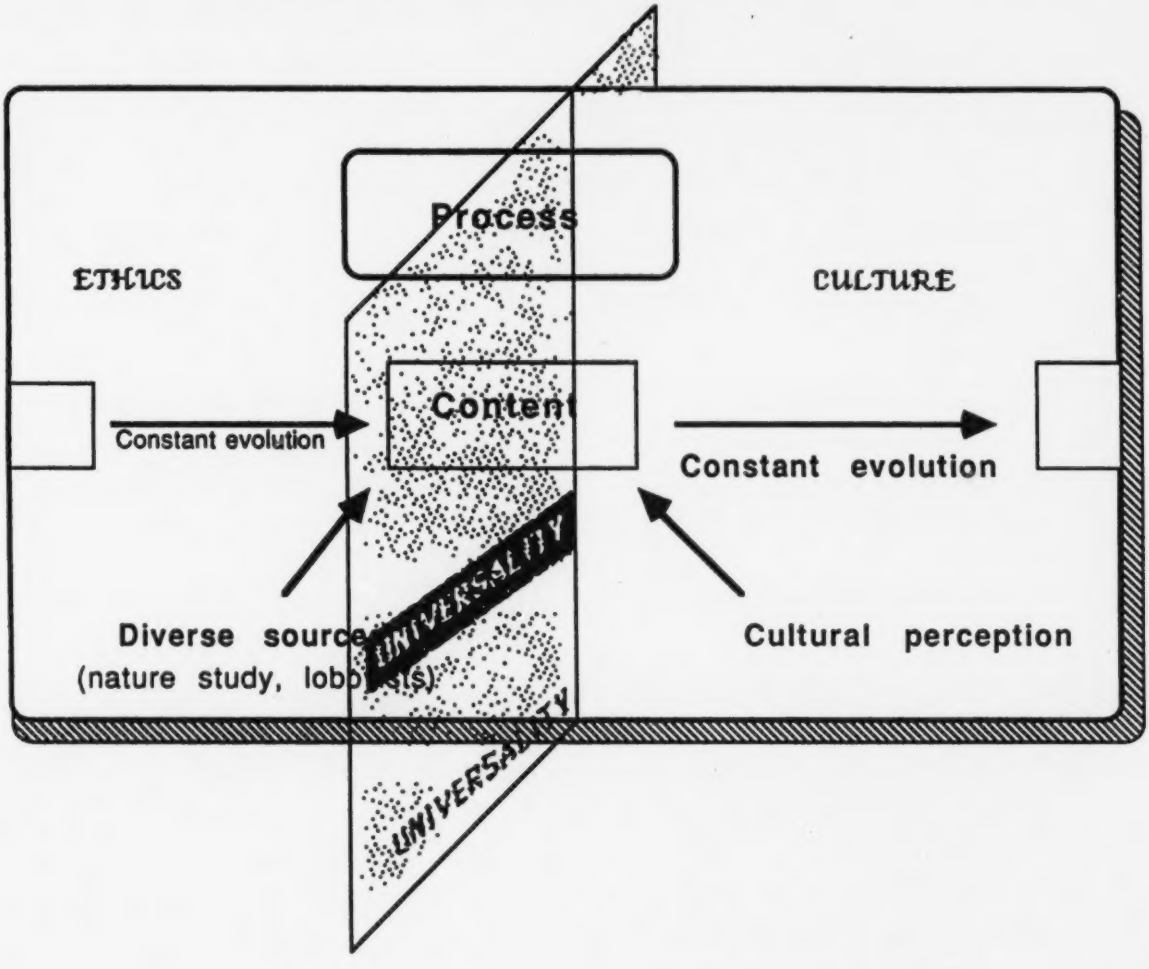

DIAGRAM 3

Parameters of Universality in EE Definition

Chapter One identified EE as a merger of process and content, and EE content as the convergence of three vectors, the diverse origins of EE, its constant evolution, and its response to culture. (Diagram 1, page 6) Diagram 3 depicts universality as a cross-section of all of these factors. What are the parameters for inclusion in this cross-section? This author identifies these as EE that:

1. May be effectively communicated across cultures.
2. Is flexible in the EE process/change agent role.
3. Is flexible in the technology through which it is communicated.

These parameters are further illustrated in Diagram 4.

Communication across cultures

EE that is universal is cross-cultural. Cross-cultural EE means EE that may be understood, if properly transmitted, by any audience. The degree and manner in which cultures, regions, individuals differ is not easily quantifiable. However it is known that at the base of our behaviors are values -- which in turn are formed from the endless bits of information we derive from our surroundings. Within a culture, where a group of people share a common heritage, rules of conduct, and similar perceptions of their environment, they develop a similar "world view."[27] This fosters more effective communication between them, because a person encodes and decodes messages based on their cultural framework of ethics, ideology, religion, values, etc.

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[27] Maletze as included in Fisher, p. 418.

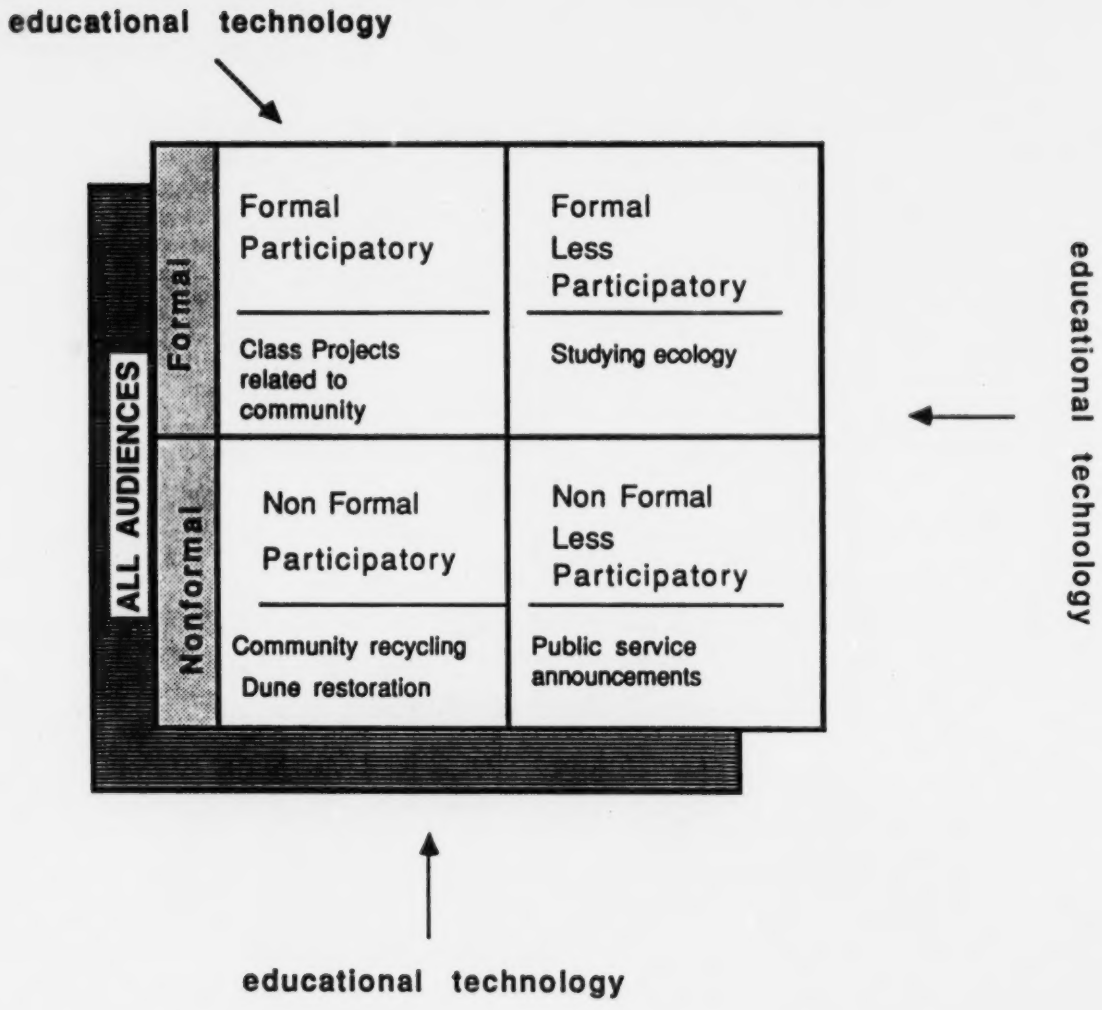

DIAGRAM 4

PARAMETERS DETERMINING UNIVERSALITY OF EE FOR ALL AUDIENCES

Cross-cultural communication is a situation where the communicator's and the receiver's environmental values are derived from very different constructs. Consider, therefore, what is required for cross-cultural EE -- the very process that is seeking to change attitudes and behaviors faces obstruction through the existing different 'world views' between the communicators and receivers.

Universal human parameters, however, do exist. Cross-cultural educators Scramm and Kumata observed in 1956, "The remarkable correspondence across cultures tempts one to say that perhaps there is a pervasive semantic frame of reference used by humans."[28] A universal frame of reference that would be valuable to environmental educators would be enjoyment of solitude and beauty. This thesis leaves identification of these universal frames of reference to others.

However, it is certain that EE relies on the natural and physical sciences. The inclusion of these universal physical and biological laws makes these aspects of EE universal. Content on basic human needs -- food, water, shelter, health -- comprise other universal EE content.

Even EE that is culture-specific, and so not universal, may be diminishing. Homogenizing trends are increasing the effectiveness of cross-cultural communication: world economic development, similar education processes, the relatively small number of news agencies, motion pictures and TV satellites.[29]

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[28] Scramm p. 230.

[29] Martin as included in Fisher p. 453.

Flexibility as a change agent

Flexibility as a change agent means flexibility with regard to EE process, which in turn means flexibility with the type and degree of participation expected from an EE activity. Chapter One (see page 14) discusses EE process in India, with examples from both a formal and nonformal setting, the teacher training workshops, and the instruction by an FAO communication specialist of villagers in the use of video cameras.[30]

These examples illustrate that participation varies with the intended audience. This concept is magnified in environmental education messages because EE implies some type of behavior change is desired (for example, start planting trees, walk more often, turn off the water tap). With persons of different cultural backgrounds, however, seeking identical behavior change is inappropriate.

For example, teaching children about the problems of deforestation involves the same scientific facts in the US and in India: lack of trees leads to a decrease in transpiration, increases soil erosion, etc. However, because the *causes* of deforestation are so different in these nations, the affective and/or participatory aspects of the learnings should be different. Teaching a child in the US that s/he should use a more efficient wood-burning stove for cooking, for example, would probably result in no change in behavior.

The Tblisi definition contains a continuum scale which progresses from environmental awareness to knowledge to attitude, ending with participation (as described on page 1). This continuum is a good indicator of the flexibility of EE process. Participation, at the end of the Tblisi continuum, is common to EE, although not to some traditional educational approaches, as CEE's teacher workshops found, or to some individuals, as the FAO specialist

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[30] All EE may be classified as either formal or as non-formal. Formal EE takes place in a classroom environment, while non-formal does not.

found in the Indian villages. Use of this scale in designing EE programs allows flexibility in the implementation of EE objectives. This is important because the specific awareness, attitudes, and type of participation sought will be unique to each audience. Therefore, EE universality is dependent in part on the Tblisi definition, to ensure flexibility for educators' individual needs.

Technology and the communication of EE

EE moves through individuals, organizations and media of all forms. Indian television is to be the first user of the Essential Learnings' database. US and Indian collaborators knew that they were compiling a document to be used, among other things, as a source of television content. Chapter Four will illustrate how the database may be adapted for various educational technologies. Here is a continuation of the CEETV case study introduced in Chapter One, illustrating the use of EE through television. (For details on Indian television, see Appendix A)

From the United Nations University in Tokyo, outgoing rector Dr. Soedjatmoko of Indonesia stated that the most pressing need of the 21st century is a poor man's education system. Faced with increasing populations, he says:

> *"We are reaching the outer limits of what our school system can do. To hope that....classrooms, schools, and so forth can keep up...is an illusion. We will have to look for new learning systems, new learning strategies that go beyond our basic concepts of education."*[31]

Soedjatmoko sees television, and its potential power to reach large populations, as a solution. In India, television has other powers: the nation has immense pockets of illiteracy, but a

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[31] Kidder.

strong tradition of orality -- with educational messages passing through puppet shows, religious plays, art and dance. Many consider literacy as required for education -- particularly to achieve the analytical weighing of possibilities and outcomes that concern environmental educators.[32] Yet the visual power of television continues education in the familiar vein of the puppet shows, an advantage over formal education.[33]

Educational TV (ETV) in India has had several resounding successes. New Delhi introduced ETV broadcasts to area schools in 1961, adding community viewing programs by 1965. In 1969, at the impetus of the late physicist, Dr. Vikram Sarabhai, India decided to implement a Satellite Instructional Television Experiment (SITE), to direct beam instructional programs to remote rural areas.[34] SITE was a great success; between August 1975 and July 1976 2,330 villages in India received programs on agriculture, family planning, and health.

These experiences, however, have not answered what educational television and environmental education together might achieve. According to Binod Agrawal of the Development Education Communication Unit (DECU) in Ahmedabad, there is little information on the specific topic of children, television, and the environment.[35] And as British communication researcher John Fiske noted, decades after its introduction, the main thing that we know about television, is how little we know about how we learn from it.[36]

EE is concerned about the possibility of affecting behavior change through television, for when the topic is EE, behavior change is a chief concern. Before behaviors are changed, however,

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[32] Narashimhan. p. 151.
[33] Howard, p. 43.
[34] Acharya, p. 17
[35] CEETV. Approaches to our Series
[36] Hodge/Tripp. Introduction

attitudes must be affected. Yet studies on attitude change through television transmit an image that is less than clear.

An early evaluation of film's potential for attitude change was conducted by the US Army in the 1940s, following its use of the "Why We Fight" World War II training films. Despite initial attitude change (positive feelings toward the British, and antagonistic towards the Germans and Japanese), the study concluded that a single mass communication message was unlikely to cause long-term attitude change.[37]

However, evaluations of carefully designed ETV series have shown successful attitude change. Evaluators of 3-2-1 Contact, a program for middle school science students, say the programs, combined with active teacher and parent support, and out-of-school science activities (museum visits, field trips), have caused positive attitude change towards learning about science.[38]

Attitude change, and further, participation are tied into CEETV project's projected use of television. It is thought that the videos will motivate the children by presenting characters and situations with which they can empathize. It is also hoped that the videos will assist the children in developing problem-solving strategies as they become involved in the story's search for a solution, and that they will translate this involvement into participation in environmental problem-solving.

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[37] Severin p. 166.
[38] Chen. In its entirety.

Methodology of Identifying Universal Elements in EE

Identifying cross-cultural EE content

The influence of culture on human environmental interrelationships has been of interest to me since I taught high school biology and ecology in the Fiji Islands for two years in the early 1980s. It was a mixed classroom of indigenous Fijians and East Indians, taught by an American whose previous job had been researching and lecturing on loggerhead sea turtle conservation. In Fiji, my audience ate sea turtles.

But what interested me most was the distinct differences between the Indian and Fijian students' responses to the ecology mandated by the Fijian biology curriculum. For example, the Indian students preferred clipped lawns -- monocultures -- for field trips, while the Fijians preferred diverse systems -- local rainforests and coral reefs. Further, in discussing the interrelationships within diverse systems, based on the rapidity of their responses, and their test scores, I felt I was giving the Fijians new names for familiar concepts.

I made many such observations on the diversity of cultural responses to EE concepts. These became the root of this thesis, as interest in comparing the environmental attitudes of the Indians I had taught in Fiji with Indians in India, encouraged my graduate work with the CEETV project. Although my research did not pursue this course directly, these earlier observations, and the observations I made during my six months in India, became a component in my compilation of an EE database for an Indian audience and, later, in my analysis of the universality of that document.

How did I decide which entries would be effective regardless of culture? As stated earlier, some EE content is universal in its origin in physical and biological laws or in basic human needs. To identify what is not obviously universal, skill and experience is

required in understanding cultures outside one's own. According to Maletzke, understanding a foreign culture requires 1.) understanding their way of seeing, 2.) experiencing and judging the culture, 3.) accommodating their cognitive structure and 4.) adopting a foreign frame of reference.[39]

My nearly three years of living in foreign cultures required all of these considerations, leading me to a more neutral world view. Because of this I was able to analyze the database for cultural universality from a more neutral vantage point.

In addition I evaluated each of the 630+ entries by asking, *Is this entry something that would be found in typical U.S. middle school EE curricula and is it equally applicable for (most) other nations as well?* Having taught in a US eighth grade, and in Fiji as well, and having thoroughly reviewed many Indian and Developing World materials and the major U.S. materials currently in use (e.g., Project Learning Tree, Project WILD, NEED, the several works of Dr. William Stapp and associates, etc.), I felt qualified to make this judgment.

I designed a computer search of the database's 630+ entries on Indian words and phrases, and then searched the database manually, for classification of the entries as Indian, Developing World, or Universal. Pie charts will show the database's content, based on the percentages of entries that were coded into categories listed above. These charts serve as an interpreter for Essential Learnings' universality answering *What percentage of these learnings are applicable outside of India?,* and are included in Chapter Four.

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[39] Maletzke as included in Fisher p. 413.

Educational coding key to change agent flexibility

Based on the cross-cultural criteria above, some entries would be evaluated universal, while others would not. However, use of the Tblisi continuum of educational objectives in the design of the database, (detailed in the next chapter) resulted in all entries being potentially flexible in their role as a change agent. The results of this flexible coding of each entry, from awareness to participation, and by other characteristics, was tabulated and presented in pie charts. This analysis answers questions such as, *What is the average level (introductory, immediate, advanced) of essential EE learnings? What percentage of EE content is fact and what percentage opinion?* and *What are the percentages of entries coded in each of the educational objective categories, awareness, knowledge, attitude, participation?*

While coding the entries made the database universally applicable, analysis of the coding through pie charts offers a process definition of Essential Learnings. Potential use of this coding in instructional design, using CEETV instructional objectives, follows in Chapter Four.

Findings

The findings in this thesis are based on Chapter Four's analysis of the universal aspects in Essential Learnings definition of EE. First, this thesis concludes that the database, designed for a specific EE project between the US and India, resulted in EE content that is generally relevant across cultures.

Second, the database's universality in EE process is a result of its educational coding. The coding of entries by educational level, educational objective, and type of content allows flexibility in instructional design to meet the varying needs of different audiences.

Specifically it is illustrated that on a three-point scale of difficulty of entry, (introductory, intermediate, advanced), 90% of EE learnings are not advanced. In addition, only 43% of the EE database is coded as opinion and/or issue, compared to the 57% coded as fact and/or data. This indicates that EE process can rely on cognitive roots, while providing material for debate. Also, a small number of entries (6%) are coded participatory (44% are coded knowledge, 26% awareness, and 24% attitude). This is concluded to be as a result of the database's intended use in situations where teachers and other instructional designers may have few other factual EE resources.

Chapter Three
How Essential Learnings offers a Definition of EE

This chapter will discuss the formation of the Essential Learnings database, which was introduced in Chapter One as the joint effort between the US and Indian sides of an international EE project to clarify the question, *What do you teach when you teach environmental education?*[40] Establishing that the methodology utilized by the US/Indian effort has resulted in a framework and a definition of EE is important, because Chapter Four will analyze the universal aspects of the Essential Learnings definition.

The database is a 'bottoms-up' definition and a companion definition to the traditional approach of first establishing goals, and then developing content to match the pre-established goals -- as is represented by the Tblisi definition. The base of Essential Learnings' definition is over 630 content entries, that are then so coded that they may be utilized to fit the goals and objectives of individual EE programs. This design fulfills the premise stated in Chapter One regarding the importance of both EE process and content in developing an effective EE definition.

Essential Learnings employed a methodology for the summation of EE content and process, which was used in both the design and editing of the database. For process, the database relied on the Tblisi definition in developing its system of coding. For content, the three vectors affecting content, the diversity of sources, the constant evolution, and cultural relevance, were incorporated in the following three ways. Through:

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[40] It may be helpful at this point to refer to Appendix A for project details.

1. Building on established concept bases of EE content to develop the framework of categories and as a source of entries,
2. An extensive literature search in India and US -- over 200 references were surveyed.
3. Employing the Delphi system by relying on environmental science and education experts for evaluation of content. Material was reviewed by 50 environmental educators, and other professionals, and approximately 30 authors contributed entries.

There were two components of the cultural relevance methodology:

1. Cultural immersion on the part of this author, as noted in Chapter Two played a role in the evaluation of the cultural relevance of database content. Involved in the database from its inception, I worked first with the US contributors in the US, and then with the Indian developers in India.
2. The database represents considerable cross-cultural review, including compilation and review by both Indian and US environmental specialists and educators.

The process of developing the database is discussed in four parts, first the logistical history, second database design, third the collection of content, and fourth the process of expert review. All but the first section are illustrated with examples from Essential Learnings.

A logistical history of Essential Learnings

Early on Dr. David Hanselman, the US co-director of the CEETV project, originated the idea of a concept base. Work began on Essential Learnings in the US in September, 1986 when Shamili Ajgaonkar, Dr. Hanselman, and this author drafted the method and began to assemble the first entries.[41] Apple Macintosh computers had been selected as most appropriate for the project, and were installed in the US and in India. Borland's Reflex was employed as a database program that met our needs, and was relatively easy to use.

By January, 1987 several hundred entries had been entered. Hanselman took this first draft to CEE (in both hard copy and on disc) where it was discussed in detail and several early modifications were made to the coding.

Upon his return, US contributions continued, following the feedback of Indian reviewers. Meanwhile, the Indian team appointed Mamata Pandya, Alice Varkey and Himani Desai to the task of editing the first entries and adding new ones. In both countries this initial collection process continued into April, 1987 and encompassed the review of nearly 200 Indian and U.S. environmental education references. Additionally, over 50 environmental educators and other professionals were consulted, yielding over 700 concepts, objectives, and facts.

A rough first draft, incorporating all contributions, was printed in India in June, 1987. Editing of this document began as a team effort among India project staff (Mamata Pandya, Alice Varkey, and Rupa Desai) and this author in October, 1987. This editing process again utilized the advise of environmental educators and specialists in the US and in India. This evaluation process is described more fully in the section on editing.

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[41] Ajgaonkar, as a MS candidate at SUNY brought a joint background in ecology and EE, as well as an Indian perspective, to the project.

With the external reviews in hand, by April, 1988 the 600+ entries that remained had been woven into a uniform style and format. The database is being used by the CEETV project; detailed discussion follows on this case study's use in the second section of Chapter Four. Recognizing the wide potential of the Essential Learnings database, the project co-directors and the sponsoring institutions have decided to make it available to the international community in hard copy and on disk. Because Essential Learnings has yet to be published in hard copy, a prototype version has been prepared, which is included as Appendix B.

Database Design

Content Categories

The intent was to first design a comprehensive content framework for environmental education in India: the conceptual pegs upon which individual entries could hang. As cited in Chapter One, according to Helgerson, "a framework is essential for thinking about environmental problems." The framework of categories developed was influenced by the format of Gardella's EE Curriculum Inventory (1986), and the EE categories established by the Federal Interagency Committee on Education (FICE), 1976.[42] (Diagram 5)

These earlier divisions of EE into categories were nearly unanimous in their division of material into concepts proceeding from a foundation of natural science functions and principles, in which humans are not emphasized, to concepts pertaining to humans' interaction with their environment. In adapting this approach, Essential Learning entries are classified "A", natural science or "B" human. Sub categories then more distinctly classified each entry (e.g., A2.1 Solar and A5.3 Biogeochemical Cycles and B2.1 Natural

[42] Gardella's inventory and the 1976 FICE committee report were utilized in their entirety.

DIAGRAM 5

ENVIRONMENTAL EDUCATION CATEGORIES

A0.0 Biosphere
A1.0 Ecosystems
A2.0 Abiotic Components
- A2.1 Solar
- A2.2 Atmosphere
- A2.3 Land
- A2.4 Water

A3.0 Biotic Components
- A3.1 Evolution and Biodiversity
- A3.2 Plant
- A3.3 Animal
- A3.4 Soil

A4.0 Energy
A5.0 Processes and Systems
- A5.1 Interdepencencies
- A5.2 Physical Processes
- A5.3 Biogeochemical cycles
- A5.4 Food chain, web, trophic levels
- A5.5 Community
- A5.6 Population
- A5.7 Habitat & Niche

B0.0 Human
- B1.0 Humans as components of the biosphere
- B1.1 Human needs: biosphere support of human life
- B1.2 Human environmental influences

B2.0 Natural Resources
- B2.1 Natural Resources Management
- B2.2 Resource Management- BIODIVERSITY
- B2.3 Resource Management - MINERALS
- B2.4 Resource Management - SOIL
- B2.5 Resource Management - FORESTS
- B2.6 Resource Management - WILDLIFE
- B2.7 Resource Management - LAND USE
- B2.8 Resource Management - WATER
- B2.9 Resource Management- ENERGY

B3.0 Science and Technology
- B3.1 Food & Agriculture
- B3.2 Manufacturing
- B3.3 Appropriate Technology
- B3.4 Sustainable Development/Limits to Growth

B4.0 Pollution
- B4.1 Environmental Health

B5.0 Population and Demography
- B5.1 Human Settlements

B6.0 Behaviour and Social Systems
- B6.1 Cultural & Religious
- B6.2 Political/ Environmental Legislation
- B6.3 Economic
- B6.4 Social
- B6.5 Values / Ethics
- B6.6 Education and Communication
- B6.7 Participation / Voluntary Action

Resource Management, B3.4 Sustainable Development).

In the draft of the database included as Appendix B, there are 241 of these natural science entries, mainly ecology and geo-physical science. There are 394 human environmental interaction entries. Because there is primary and secondary classification of the entries, some that are coded "A" may be cross-referenced in the "B" section, and visa versa.

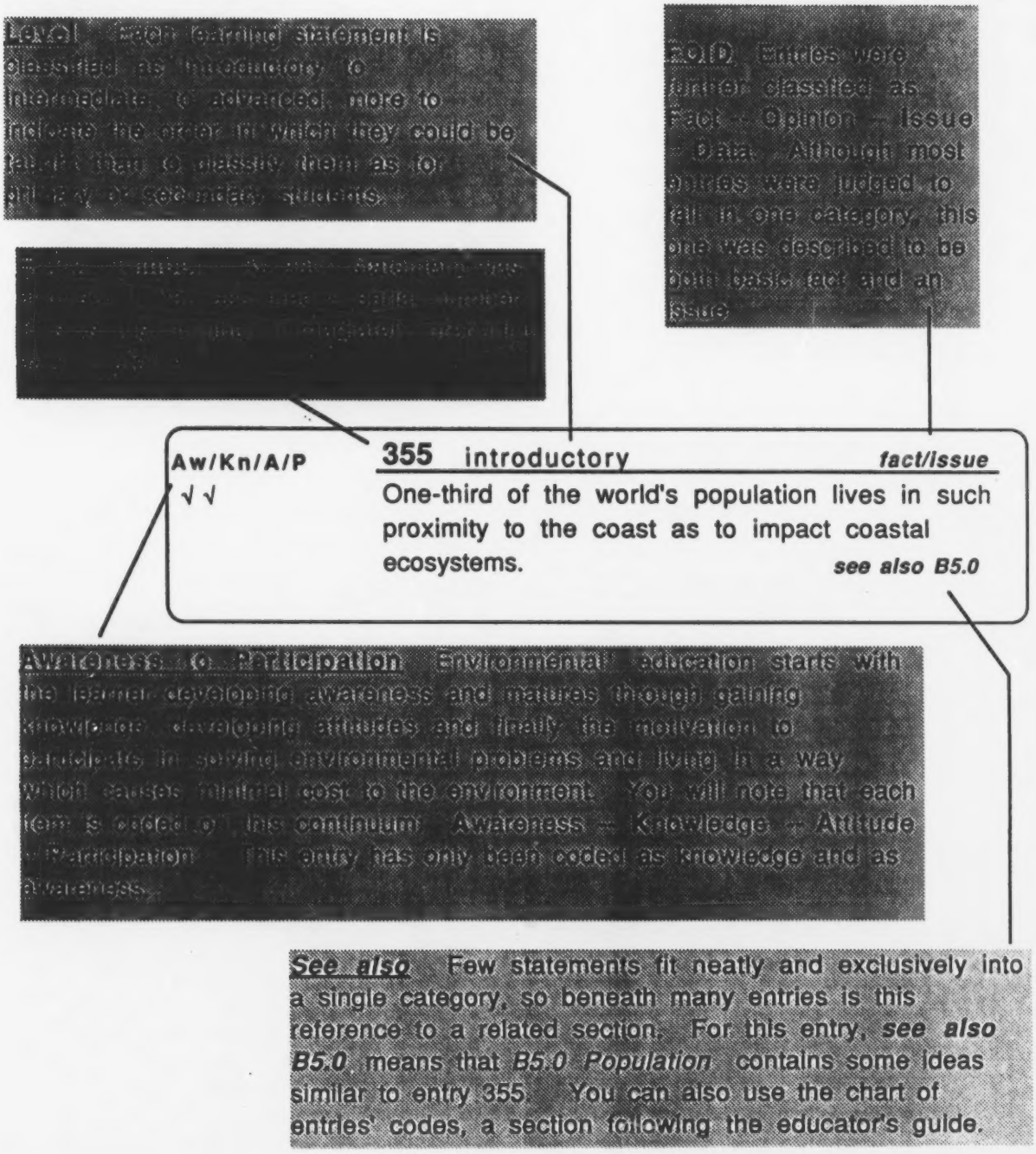
Leafing through the Essential Learnings Educator's Charts (Pages *16-51* in Appendix B), reveals that the "A" section is primarily awareness/knowledge, while the "B" section contains more attitude and participation entries, suggesting that even the division of EE by content is affected to some degree by EE process.

Entry design

Designing the database entry form required incorporating a system of educational coding, first because Essential Learnings' was created for in-house use by staff working on the CEETV project module/curriculum development, and second because educational coding would make the database a valuable resource for other environmental educators, such as writers of curricula and teachers. (See Diagram 6 for sample entry)

DIAGRAM 6

Sample entry


Aw/Kn/A/P
√ √
355 introductory
fact/issue
One-third of the world's population lives in such proximity to the coast as to impact coastal ecosystems.
see also B5.0
See also Few statements fit neatly and exclusively into a single category, so beneath many entries is this reference to a related section. For this entry, see also B5.0, means that B5.0 Population contains some ideas similar to entry 355. You can also use the chart of entries' codes, a section following the educator's guide.

BEST COPY AVAILABLE

Coding of the entries was felt to provide cues as to the use of individual entries for a variety of audience-specific needs. The entry coding which was designed classifies each of the 630+ entries according to the following:

1.*educational objective* (awareness, knowledge, attitude, participation)[43]
2. *level of difficulty* (introductory, intermediate, advanced),
3. *type of entry* (fact, opinion, issue, data).
4. *secondary code/see also.*

All of these categories are designed to give the user of the database an idea of an entry's intended use -- to provide a starting point for their EE program. It is also hoped that the coding will prevent the databases' misuse -- such as keeping an entry coded as 'opinion' from being taught as 'fact.'

Of these four entry codes, only the *educational objectives* closely follows the description of educational objectives set forth in the Tblisi statement's sub-goals, that EE should achieve change in awareness, knowledge, attitude, and participation:

> Awareness -- to help individuals and social groups acquire an awareness of and sensitivity to the total environment and its allied problems
>
> Knowledge -- to help individuals and social groups gain a variety of experiences with the total environment and to acquire a basic understanding of the total environment, and its associated problems.

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[43] Stapp. p 4-6. He discusses an additional skills category as a component of the Tblisi approach. This was not made a part of the CEETV database because of the difficulty in specifying specific skills in the general learnings. As EE materials are developed from the database, skills would be a component of those learning objectives.

> Attitudes -- to help individuals and social groups acquire social values, strong feelings of concern for the environment and for the motivation for actively participating in its protection and improvement.
>
> Participation -- to provide individuals and social groups with an opportunity to be actively involved at all levels in working towards resolution of environmental problems.[44]

The *level of difficulty* and *type of entry* codes are utilized as standard instructional design elements. The level coding is useful when facing concerns of the following nature: Are there any ideas/concepts too difficult to convey to an audience which is new to EE? Which of the Essential Learnings entries are the simpler to convey?

The *level of difficulty* scale is not based on age groups (e.g., primary/secondary grades), but on the level of pre-instruction understandings. EE builds on previously acquired knowledge in the same way that that algebra builds on basic concepts of mathematics. Level one entries must assume some prior knowledge, but not necessarily 'EE knowledge.' For example entry #90 assumes the learner understands 'habitat', and in entry #333 perceptions of minerals, farming, and construction are required.

Essential Learnings does not include uniform clusterings of entries progressing from level one to three. There are, however, some examples where this flow occurs, such as the following series on pollution and health:

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[44] Stapp p. 5.

Level 1/Introductory,

ENTRY 461/ B4.0 POLLUTION

"POLLUTION is the addition of unwanted substance to, or any alteration of the environment that adversely affects human health or any living system."

Level 1/introductory,

ENTRY 488/ B4.2 ENVIRONMENTAL HEALTH

"Good health is the foundation of human welfare and productivity. Our health is a reflection of the quality of our environment. For good health our environment should provide access to sanitation, clean air, food, and water."

Level 2/intermediate,

ENTRY 490/ B 4.2 ENVIRONMENTAL HEALTH

"Some pollution costs (e.g., poor health) cannot be expressed in dollars or rupees."

Level 3/advanced

ENTRY 492/ B 4.2 ENVIRONMENTAL HEALTH

"Pollutants accumulate in our body from a variety of sources, the air we breath, our food and water, and our habits. This can result in SYNERGISTIC or cumulative effects (respiratory difficulties, cancer). When calculating the effects of pollution, synergistic effects are seldom considered.

Type of entry is the most subjective of the databases's classification schemes. What is an 'issue,' is also often 'opinion,' or even established 'fact.' 'Facts' in the database are information that has been well-established scientifically -- that are not open to alternative interpretation, and that generally have no affective ties. For example:

fact

ENTRY 40/ A2.2 ABIOTIC COMPONENTS - ATMOSPHERE

The ATMOSPHERE of our earth is a thin envelope of gases, about 11 km high, which is maintained around the earth by gravity.

Many entries, such as entry 467 on the Greenhouse Effect, are coded both as fact and as issue. This means that the science is firm, but there are either alternative points of view or the knowledge has 'affective power.' A few entries are coded solely as issues, meaning the entries' chief purpose is for student consideration and discussion, rather than the learning of associated facts. For example the following entry was written about eucalpytus plantations, a hotly debated issue in India:

issue

ENTRY 311/ NATURAL RESOURCE MANAGEMENT - FORESTS

The extensive use of eucalyptus trees in reforestation programs has raised many issues: their growth in low nutrient and water-poor soils to provide a dependable cash crop has met with success. Yet, their depletion of soil nutrients and their heavy water consumption, and their failure to provide fuel and fodder has met with criticism...

'Opinion' coding is foremost a flag on how the entry should be used -- there will always be alternative viewpoints and affective links associated with these learnings.[45] For example:

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[45] Meaning, opinion entries will often be coded as attitude and/or participation objectives.

opinion ***attitude/participation***

ENTRY 397/ NATURAL RESOURCE MANAGEMENT - ENERGY

We should strive to develop those energy sources which are ecologically most acceptable. Even though they may be less economical in the short-term, the long-term benefits should be considered.

'Data' coding is straight-forward; entries coded as 'data' include specific numerical information, and are usually also coded 'fact.' Few of the database entries contain data. An example of one that does:

issue/data

ENTRY 305/ NATURAL RESOURCE MANAGEMENT - FORESTS

Indian forests are under heavy pressure. With less than two percent of the global forest cover, the forests of India are expected to provide for 15% of the global human population, and about 15% of the global cattle population.

The *secondary code* listed at the end of each entry as *see also* is a cross-referencing tool. It refers the user to the next category of Essential Learnings most closely related with the entry. For example:

ENTRY 375/ B2.8 Water Resource Management

India is using only a tenth of the water it receives annually and even 40 years from now, will be using only a quarter. Rain water should be collected and stored well.

see also A2.4 Abiotic Components/Water

Identifying content

As was discussed in Chapter One, *What to include as content?* is a difficult question for environmental educators, because of the diverse and constantly evolving nature of the field, as well as the cultural perception of the EE that is relative to the audience. *What science is essential to EE learnings?*, and *Should an activist approach be taken?* are among questions raised in the formation of this content overview. Essential Learnings began answering these questions with concept bases.

The use of concept bases in identifying content

Concepts are the cognitive divisions through which humans focus, perceive, organize, and remember vast amounts of information.[46] According to Goldstein, "All approaches to personal, interpersonal, and social change depend on the manipulation and use of concepts."[47] Therefore, concept bases are historically used in establishing educational content.

R. N. Saveland said in his Handbook to Environmental Education, "Collecting EE concepts is like collecting moonbeams. You cannot hold them in your hands."[48] However elusive, several works since the 1950s have defined environmental education through concept bases (notably Hanselman, Visher, White and Yambert). The two most popularly cited of these are the 1969 work of Robert Roth, who compiled and tested a collection of 111 environmental management concepts, and the early 1980s work of Robert Townsend, who worked with Roth as his advisor at The Ohio State University.

Townsend reduced Roth's list of 111 concepts to 54, using an interdisciplinary panel based at The Ohio State University. He then

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[46] Bell p. 153
[47] Goldstein p. 307
[48] Saveland p. 3

confirmed the importance of concepts in developing EE, and investigated the underlying structure of the domain of the concepts. These underlying dimensions were identified as: ecology, culture, ethics, natural resource management, and population.[49] Many additional concepts were found in the works of Stapp, Brennan, and the Federal Interagency Committee on Environmental Education (FICE) 1976 report.

These earlier concept bases for EE were the first source of entries for Essential Learnings. A typical concept entry is as follows: *Humans are a part of, not apart from, the environment.* The concept bases also suggested general themes, such as those described by Townsend, and in doing so, contributed to the framework of categories developed for the database. (Diagram 5)

Essential Learnings is not only a collection of concepts -- it also includes facts, issues, learning goals, definitions, etc. The following illustrates a selection of the type of entries contained in the database, as derived from the concept bases and other sources.

Concept
558 The earth is one, but the world is not. Each nation strives for prosperity within its geographic boundaries, with limited regard for its impact on others.

Learning goal
628 We should be selective in our consumption of natural resources, choosing those which result in the least damaging wastes or by-products.

...which could lead to Learning Objective
Students will demonstrate their understanding and concern for conserving natural resources by making conscious choices in their use of natural resources which are least damaging.

Definition
495 OVERPOPULATION occurs when the population exceeds the limit that the resource base can support without stress.

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[49] Townsend abstract and summary.

The literature search

Database development then went out in new directions in making its content current, and responsive to the needs of India. Content-specific EE materials such as those on conservation, wildlife appreciation, citizen participation, ethics, global pollution, and toxic waste provided many entries. Surveying other environmental materials in the fields of sociology, ecology, biology, law, and economics - was also fruitful. These sources provided most of the topic-specific concepts. Sourcebooks such as Our Common Future and State of the World 1987 were also utilized; they provided much of the more recent data and concepts, particularly on sustainable development. Nearly 200 Indian and US references were screened.

This process was key to making the database culturally relevant, in that both US and Indian researchers collected and wrote content, and in that the references consulted originated in both the US and in India. Expert review of the database additionally strengthened the cultural relativity of the product.

Expert Review

Editing of the June, 1987 Essential Learnings draft, a volume which contained all CEE and US contributions, began as a team effort among CEE project staff and this author in October, 1987. Diagram 7 illustrates this process in the context of this case study's development. Just as consultation with environmental specialists was key for generating entries, reviewer evaluation from both Indian and US environmental specialists and educators, was important during the editing process. These reviewer perspectives shaped the document with respect to the definition Essential Learnings offers of EE.

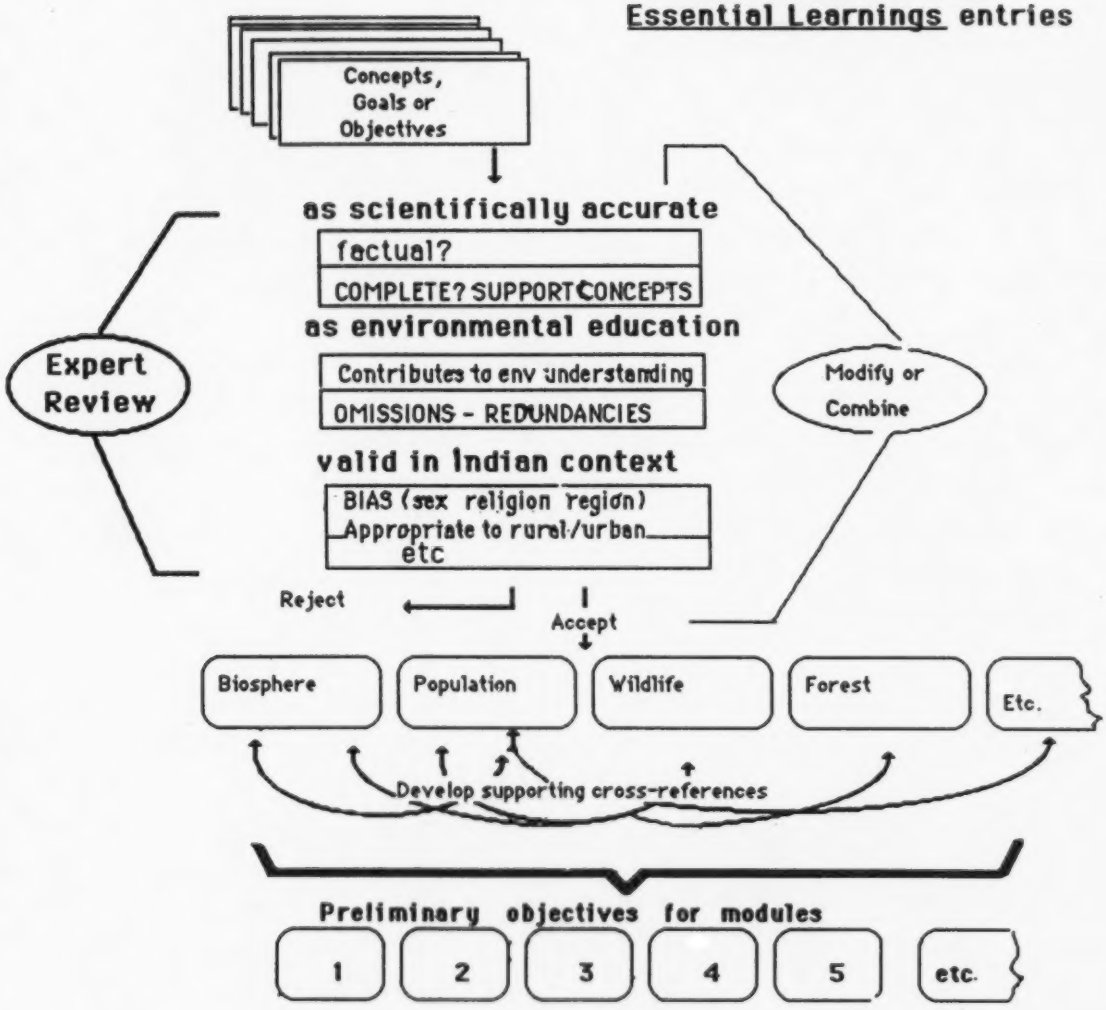
Many reviewers were environmental educators (e.g., the 75+ staff members at the Centre for Environment Education in India), and many were college professors with expertise in a one or more fields of environmental science and management (e.g., marine biology, urban growth, water management, etc.).

Scientists and educators qualified to evaluate several categories of the database were preferred, such as those from an interdisciplinary background, for the sheer economy of their being able to evaluate large sections. Also those evaluating several sections were working within the context of the interdisciplinary purpose of the database. Educators' comments were valued as they helped structure the entries as the starting point for instructional development (level of entries, simplicity of language).

Overall, reviewers analyzed Essential Learnings from one or more of the following three perspectives: (Also see Diagram 7)

DIAGRAM 7

The Process of Expert Review in determining Essential Learnings entries



1. As scientifically accurate
2. As appropriate for environmental education (not too advanced for intended audience, or evangelical, outmoded or otherwise inappropriate in style)
3. Culturally relative to Indian audiences

These perspectives incorporate the three vectors of content introduced in Chapter One: the problematic diversity and continuing evolution of EE are components of evaluating the entries as EE, while the third perspective 'culturally relative to Indian audiences' is representative of the cultural determination of EE content.

Many reviewers did not look beyond scientific accuracy -- particularly those without a background in education, or those unfamiliar with environmental education.[50] Environmental educators were insightful in making the database representative of EE. As would be expected, cultural relevance in the Indian context was commented on most clearly in the Indian review.

[50] As discussed above the purpose of the database (as a concept base to be used to guide instructional development) seemed unclear to many reviewers. They looked at the database as a collection of definitions, or as a textbook. Reviewers of this type were very useful, however, with the "A" section, which is very factual. They made sure coverage of a topic was complete and accurate.

Evaluating entries as scientifically accurate

The first and most important goal was eliminating inaccuracies. Therefore an entry on rainforests followed the following tortuous route:

> ***June 1987 draft***
>
> Tropical rainforests, with their tall stately trees, rich variety of animals, birds, and insects, are a climax community resulting from an extensive growth period. With an average rainfall of **1200 mm**, high humidity. and soil rich in humus, these forests are rich repositories of medicinal plants...
>
> ***CESF CEE revised draft December 1987***
>
> Tropical rainforests, with their rich variety of plant and animal life, are a climax community resulting from an extensive growth period. With an average rainfall of **8000 mm**, high humidity, and soil rich in humus, these forests are rich repositories of medicinal plants...
>
> ***Revised by Wildlife Institute of India March 1988***
>
> Tropical rainforests, with their rich variety of plant and animal life, are a climax community resulting from an extensive development period. With an average rainfall of **2000-4000 mm**, and high humidity, these forests are valuable for their timber and other useful products...

Evaluating entries as EE

Evaluating entries as EE called for more subjective analysis. One issue in determining which entries were representative of EE was, what is appropriate -- not too elementary as to be a "general learning" or not so advanced as to be beyond the realistic goals of EE learnings.

too advanced for intended audience

When a population is introduced into an ecosystem, the excess of births over deaths results in a typically S-shaped pattern of growth...

it became ENTRY 189

When a population is introduced into an ecosystem, it grows rapidly, levels off, and then declines...

Another issue was, which issues actually contribute to learning. Environmental teaching lends itself to dramatic statements, which are often quite glib. These were screened.

inappropriate in style -- meaningless alliteration

The "P" problems of the environment include population, poverty, power, pollution and poisons.

It was eliminated from the database

Another concern was those entries which were accurate, but which were not representative of EE. Many of these were fundamentals of science, sure to be introduced more appropriately elsewhere. For example:

General science -- not EE

Water remains a liquid between zero and one hundred degrees Celsius...

It was eliminated from the database

Evaluating entries as culturally appropriate: cultural perception in the definition of entries

Essential Learnings's compilation was an exercise founded on the need to determine the educational requirements of an Indian EE program, as opposed to an EE program anywhere else. Thus this entire process of asking, *What is EE in the Indian context?* was infused with an underlying and interwoven concern, that the contents be culturally relevant. Reviewing Indian sources, and using Indian examples were first steps in making the database responsive and appropriate to Indian needs. But this was not enough. The expert review resulted in significant changes in database content with respect to relevance to Indian audiences.

Deciding what constitutes environmental issues, globally or in India, caused little argument between US and Indian collaborators on Essential Learnings -- differences arose on the perceived root and solutions of these problems. The cross-cultural editing process involved entries in the later sections of the database -- the entries on population, living conditions, and socio-economic environmental factors, in which there were significant US/Indian differences.[51]

Between Americans and Indians, it is the observation of this author that the essential differences with respect to environmental education revolve around the perception of the source of resource pressures. An Indian describes an American as over-consuming. An American describes an Indian as over-reproducing.

The Population section of Essential Learnings was initially written by US contributors. The following presents the changes it underwent for inclusion in the final document:

---

[51] This issue of cultural relevance, however, may be important to keep in mind even in Indian/Indian use during the CEETV project, as variances in environmental perception repeatedly arise, as the series operates within diverse cultural/lingual environs of India.

Before Indian review
Entry 496
Overpopulation is the root of most environmental problems. Among other things, it reduces the quality of life, and leads to human suffering.

After Indian review
Entry 496
Overpopulation and over-consumption are the root of most environmental problems. Among other things, they reduce the quality of life, and lead to human suffering.

Other edits by Indian reviewers were a result of awareness of cultural differences within India. For example, in response to arguments over what types of homes are appropriate, the last sentence was added to the following entry:

Entry 510/ B5.1 Human Settlements

Every human settlement has its own character, a mixture of the mood, values, and style of its inhabitants, its economics, its architecture and streets, and landscape. Therefore there is no criterion for saying whether a settlement's character is right or wrong.

Subtleties, but perhaps these edits will make the difference between a database which is used in India, and one which is not.

Chapter Four
Essential Learnings' Definition of EE and Universality

Essential Learnings' is thorough, but not exhaustive; no collection of EE content could be. Yet, the definitional process followed in the compilation of Essential Learnings provides a document that can then be examined for EE definition and for EE universality.

The coding of the database entries will be used to examine the database's definition of process in the first section of this chapter. The second and third sections will discuss universality. As was discussed in Chapter Two, EE universality in this thesis is said to stem from effectiveness across cultures, flexibility in the change agent role, and adaptability to various educational technologies. The database's' effectiveness across cultures will evaluated by analyzing the applicability of the 630+ entries outside of India. The third section of this chapter discusses Essential Learnings flexibility and suitability to educational technologies through instructional development.

Essential Learnings' Definition of EE Process

Each entry in the database is coded for educational level, educational objective, and type of content. From this information a bottom-up definition of EE process may be found through the percentages of EE learnings categorized at the various levels, along the objective scale, and as fact, opinion, issue, and data. It should be noted here that where an entry had multiple coding (e.g., both "issue" and "opinion") both codes were tabulated. Thus percentages

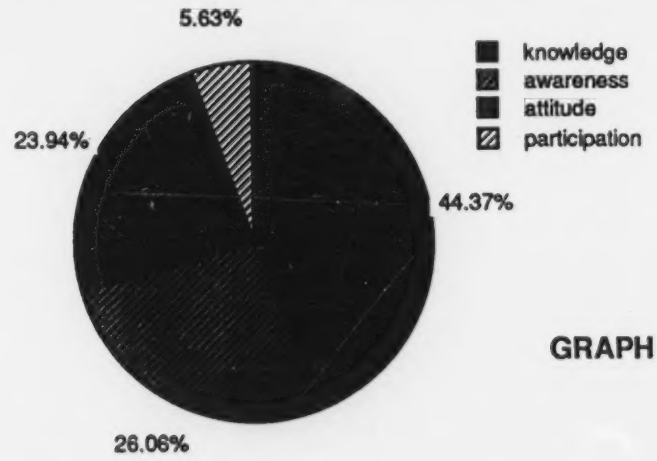
were derived from the total number of times each code category was checked.

Educational objective coding, (i.e., awareness/knowledge /attitude/ participation) in the database is a direct derivative of the Tblisi definition. As discussed in chapter three, it signifies the intent of the entry as it is written. Analysis of Essential Learnings reveals a heavy knowledge base of 44 percent, followed by 26 percent awareness, 24 percent attitude, and only 6 percent participation. (Graph 1)

The average level (i.e., introductory/intermediate/advanced) of the database offers insight to the environmental educator regarding the organization of the learnings, and helps in determining audience readiness for the learnings. In analyzing Essential Learnings for level of difficulty, an even 40 percent are introductory, 50 percent are intermediate, and 10 percent are advanced. (Graph 2).

The third code addresses the sum database content determined to be "fact," "opinion," "issue" or "data." In teaching EE, how much is pure knowledge transfer -- a dissemination of facts? How much is discussion of opinions and issues? How much data is to be learned? The process definition of EE with reference to these categories, as defined by Essential Learnings, is the majority (55 percent) of the entries are coded as facts, 28 percent as opinion, 15 percent as issues, and 3 percent as data. (Graph 3).

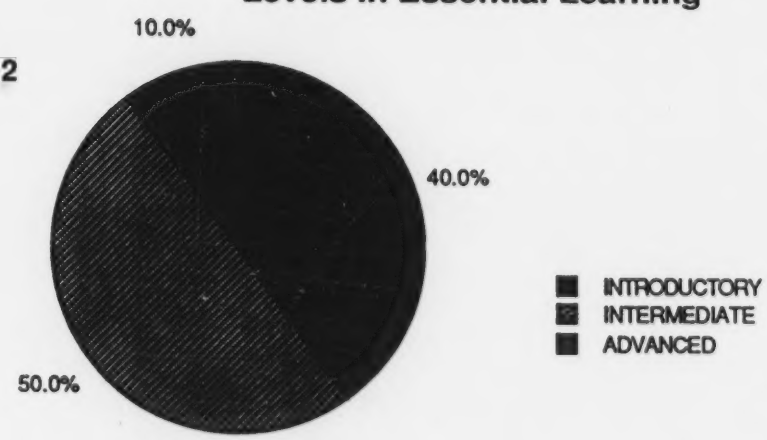
Objectives from Essential Learnings



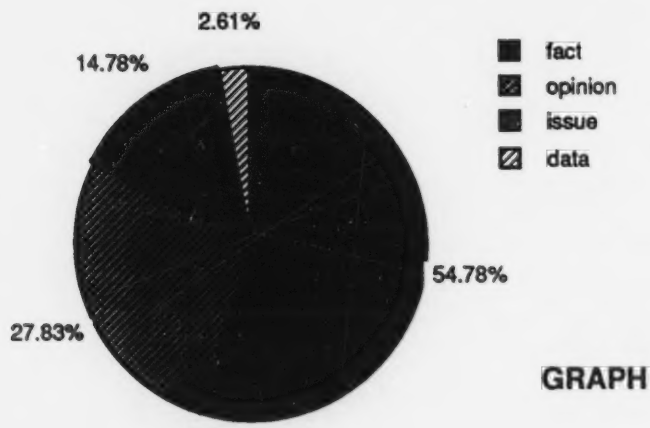
GRAPH 1

Levels in Essential Learning

GRAPH 2



Content from Essential Learnings



GRAPH 3

Essential Learnings' Content Universality

There are many ways that the content of Essential Learnings can be analyzed, e.g. applicability to marine education, to geology classes, etc. But one question was at the core of Essential Learnings evolution, *What is and what is not environmental education?* This guided the design of the coding and the formation of content. It influenced the editing of the database to favor the Indian learning environment. But in defining EE that is relative to India, was culturally relativity to other audiences lost?

This analysis focuses on a dual question central to this thesis, *How universal is the database?*, and, conversely, *How Indian is it?* In other words, *What percentage of a document designed for specific use is limited to that use?* and also, *To what extent does EE have to be audience specific in order for the document to be used with that audience?*

To determine the universality/Indian specificity of individual entries, the following classification scheme was designed. First, is the individual entry "universal" -- applicable anywhere? Note that entries essentially universal, but containing Indian data or examples, were included in this category. To illustrate:

> *Indian example but applicable elsewhere with substituted example*
> **201** HABITAT is the environment occupied by an organism or community. For example, the Rann of Kutchchh is the Indian Wild Ass's habitat.
>
> *total of entries: 37 out of 630+*

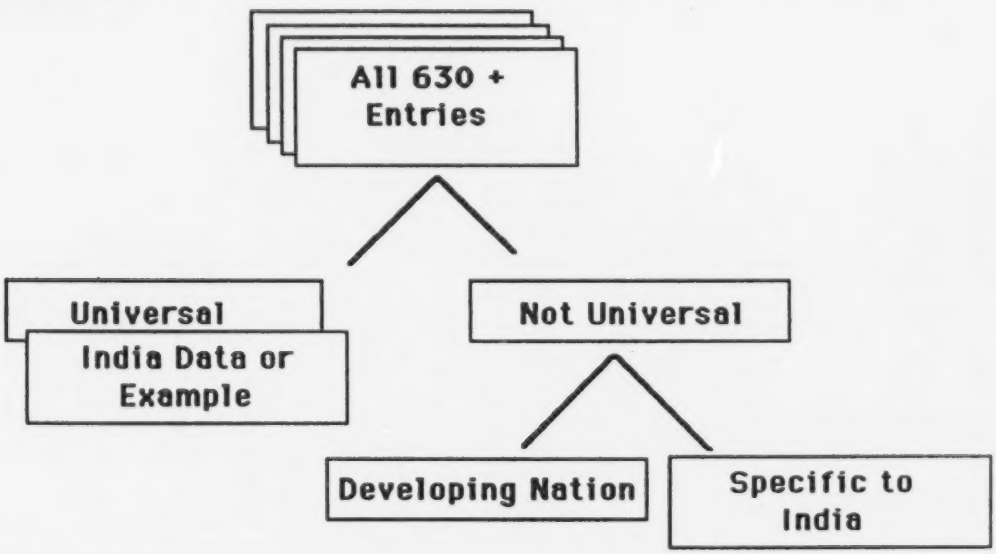
Most universal entries did not contain any Indian data or examples. For example:

General universal entry

111 There are many types of soil as a result of differences in climate, vegetation, the parent rock material, slope, groundwater, and the age of the soil.

total of entries 521 out of 630+

If not applicable everywhere, then the entry was "not universal." These entries were further divided into Developing World and India-specific. That is, did the entry address a concern shared by most of the Developing World or one very much restricted to the Indian context? These selected entries have been reproduced in Appendix C.



The basis for this classification was, as discussed in Chapter Two: 1.) the degree to which my world view expanded in my three years in Fiji and in India, to become familiar with the developing

world and India, and to a degree, culturally neutral, and also 2.) the extent of my review of Indian and US EE materials and processes.

Entries not meeting this test of universality were then either of primary concern to Developing World audiences, or Indian-specific.[52] For example:

Developing World Entry

593 In most countries, it is the women, helped by children, who are responsible for fuel collection. Thus not surprisingly, in some areas men seem unconcerned about fuel scarcity problems, and indifferent to suggestions that they should plant trees.

total of entries: 34 out of 630+

Indian -specific

540 The Indian tradition teaches us that all forms of life - human, animal, and plant - are sacred, and so closely linked that disturbance in one gives rise to imbalance in the other. Conservation is a rediscovery of this attitude.

total of entries: 38 out of 630+

At the beginning, most environmental educators involved in this case study expected to find a high degree of India-specific content to emerge. "How could a country with such a different economic base, culture and geography find developed world EE (largely U.S.) materials relevant?," it was reasoned. Yet in final analysis Essential Learnings displays a surprisingly high degree of universality in EE content. Key findings are:

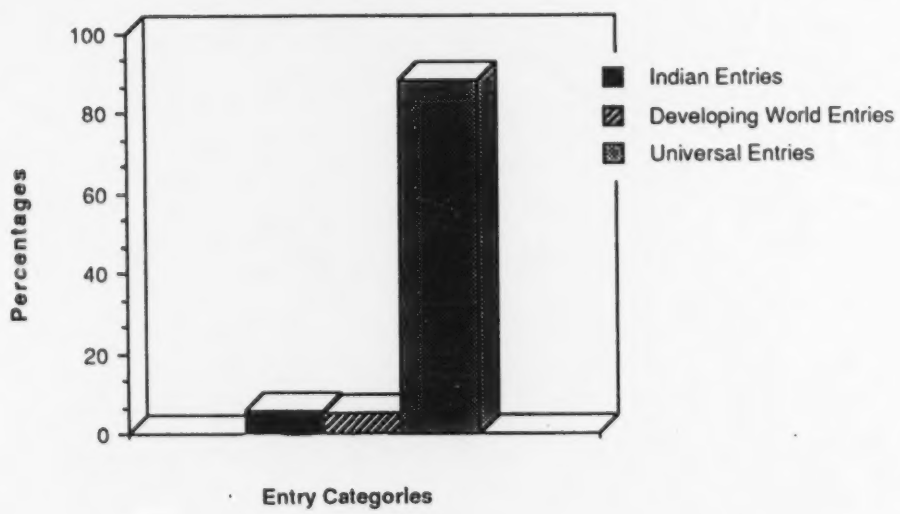
---

[52] They might well be used for an advanced high school or college audience in a Western country, but for middle school students, most teachers would concentrate on aspects of their environment closer to home, or at least global events with which the teacher could emphasize actions they could do to minimize the problem (e.g., Greenhouse effect -- don't use styofoam)

1. Entries identified as Developing World but not specific to India accounted for 5.4 percent.
2. Six percent of the entries were found to be Indian-specific.
3. Thus, 88.6 percent of the entries can be considered Universal. These include the 5.8 percent of entries with Indian examples, which are universally applicable in their conceptual content.

Graph 4 summarizes the percentage of Universal, Developing World, and Indian Specific entries determined in this manner.

GRAPH 4 **Universal, Developing World, and India-specific Entries in Essential Learnings**



Universality through Instructional Development

If Essential Learnings is of universal value how is it to be used? Its universality must extend to flexibility in the EE participation anticipated from a program, and to adaptability to educational technologies. Both are components of instructional development, whereby the teaching process is designed so that "every component is key to successful learning"[54] Instructional design also encourages flexibility for educators' individual needs.

Instructional development includes stating project goals, defining the audience and its entry level behaviors, selecting a methodology and identifying needed subskills, outlining objectives, determining ways of testing objectives (entry level skill tests, pre and post attitude tests), designing and producing the instruction (activities, methods of presenting information, the materials themselves), and lastly summative and formative evaluation.[55]

The completed Essential Learnings database contains no blue prints for instructional development, but it does provide a starting point on which the educator can amend and elaborate. Those who access the database by computer using the Reflex program can analyze its content by any number of search options to answer such questions as *What are the percentage of learnings that are primary? are fact,? are Developing World-oriented?* For the many educators who will use the database in the print format, this author devised The Educator's Chart (pp. 16-51 in Appendix B).

These features of the database's hard and soft copy versions enable a variety of simple uses for the teacher, curriculum designer, etc, including, but not limited by: 1.) researching a specific topic, 2.) designing programs at a specific level of environmental knowledge, 3.) designing a complete EE curriculum, or 4.) achieving a specific educational outcome.

---

[54] Dick, p. 2.

[55] Dick. Summary of contents.

As noted earlier and in Appendix A, the CEETV Project will use Essential Learnings to produce a series of modules for middle school students. Each module will consist of a 30-minute video program, a teachers' guide containing proposed lesson plans and teacher reference booklets. Teacher training through in-service workshops is integral to implementation. (See Appendix A for further case study detail).

Essential Learnings has several instructional uses within the CEETV series, such as module topic selection, and providing a basis for developing learning objectives. A proposed biodiversity module will be highlighted as an example of these uses (See Appendix D for a partial listing of biodiversity entries drawn from Essential Learnings) Use of the database for CEETV may be broken into four phases:

1. Identifying module topics.
2. Selecting core themes for the CEETV modules -- learnings which are basic to environmental education, and will run as a thread through the modules.
3.) Identifying primary and secondary learning objectives (drawn from individual entries) for inclusion in individual modules. This part of the instructional development process must also consider the best way to teach those learnings. What is best covered by the video? the teachers' lesson plan? both?
4.) Analytical use of the database to foresee intrinsically difficult topics/modules, or other problems (heavily participation-oriented, highly issue-oriented, etc.) and to plan the instructional process accordingly.

Identifying module topics

Developing a curriculum structure requires identifying the broad topics to be covered, as well as their sequencing and clustering. The Essential Learnings categories (Diagram 5) are useful in this process, as this list is very comprehensive, and very descriptive of EE. Used as a check for omissions, it will ensure that series' coverage is comprehensive (e.g. participation, mining, or rainforests are not left out).

The category structure of Essential Learnings suggests practical links with Indian middle school curricula. Why would this be important? The Indian educational system is very didactic -- it is largely the teaching of facts, and examination of student comprehension of these facts. Thus, many feel that for the CEETV series to be used in India's exam-oriented classrooms, the module topics selected must be closely tied to the curricula of Indian middle school students. Diagram 8 illustrates how selected module topics derived from categories in Essential Learning can be clustered to accommodate the prescribed middle-grade curricula of the National Centre for Educational Research and Training (NCERT). Use of the NCERT curricula is widespread in India. Where not used directly, most states have derived their curricula from NCERT materials. The teachers must immediately see a clear relationship between the CEETV series and the curriculum they are committed to teach.

For example, a teacher preparing students for an exam requiring knowledge of soils, should find the CEETV series directly appropriate. S/he could teach *erosion, depletion of mineral resources, the role of forests in soil formation, the role of the community in preventing soil erosion, etc.* -- all of which will be contained in the series of modules that have been derived from Essential Learnings.

NCERT TOPIC HEADINGS AND RELATED POSSIBLE CEETV MODULES

NCERT heading	Module topics
AGRICULTURE	Modern costs and Pressures Grazing and Migration Fodder shortage Genetic breeding
ENERGY	And industrialization Alternatives Renewable and Non Dams/Fuelwood
CULTURAL SOCIAL HERITAGE	Traditional environ. values Tribals
ENVIRONMENT	Global environmental trends (ozone, greenhouse) Limits to Growth
PARTICIPATION	Individual Community Government
POLLUTION	And Health Toxic Waste Bioaccumulation Control

DIAGRAM 8

The value of Essential Learnings in introducing issues facing India's people and her environment cannot be overestimated; teaching issues is not common in Indian education.

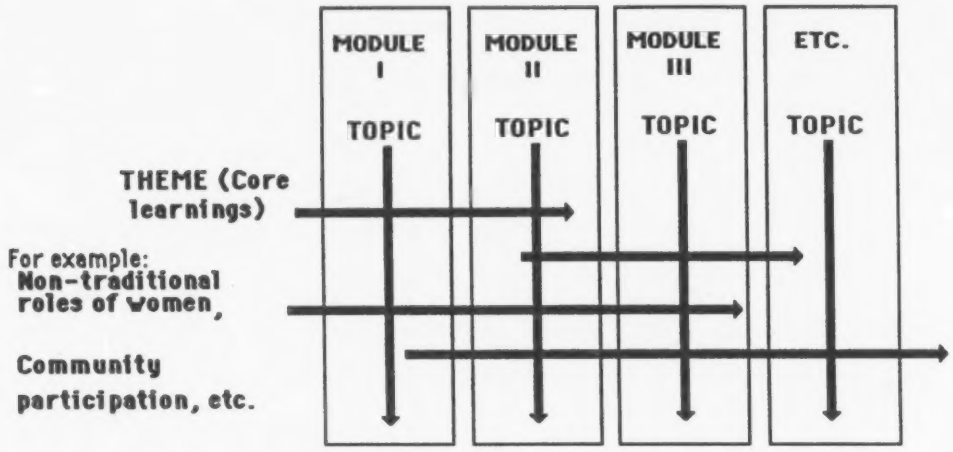
Selecting core themes

A second use of Essential Learnings involves identifying core entries, themes central to EE that should run as a thread throughout the modules. (See Diagram 9, which shows a hypothetical mapping of themes throughout a series of modules.) One approach would be to use the database to identify concepts central to the case study's goal, the Tblisi definition of environmental education. In Appendix "D", a collection of individual entries isolated for a module on biodiversity, 'core learnings' are marked with a check √. One such entry is as follows:

> ENTRY 258/ B2.0 NATURAL RESOURCES MANAGEMENT
>
> The biosphere is capable of providing an acceptable quality of life for all people if resources are wisely conserved, and fairly distributed.

Ear-marking entries of this type will be useful in early definition of series direction.

MODEL FOR USING ESSENTIAL LEARNINGS ENTRIES AS THEMES (Core learnings) AND MODULE TOPICS



Topic examples:

Water pollution, environmental health, deforestation

DIAGRAM 9

Identifying learning objectives

Once the module topics and universal entries are defined, the database should be of use in collecting specific themes and concepts for individual modules. Rather than using entries directly, it is more appropriate that they are used in writing module goals and objectives.

I followed this process in preparing a scripted treatment on the proposed biodiversity module. In compiling entries, I first listed the two sections in the database flagged "biodiversity", and I searched the database at large for related learnings. The related entries, and core EE learnings identified for use in the biodiversity module, may be found in Appendix D. After collecting all suitable "biodiversity" entries, I wrote instructional objectives for the module. Because the module is broken into video and classroom components, I then separated the objectives into print and video categories, according to which objectives I thought could best be met through each educational approach. As I was working only with the video component, I then further divided only the video objectives into primary and secondary objective groups. Examples of objectives derived from these entries are as follows:

Primary objective

1. After seeing the video, student will be able to give an example of the importance of diversity for our future and present needs.

Secondary objective

2. After seeing the video, student will be able to describe the role of habitat destruction in decline in biodiversity.

Actual use of the database will vary from module to module. However, because links between module topics and NCERT curricula, and core themes may be established from the database, using it as a resource in writing module-specific objectives will strengthen the instructional design of the CEETV project.

Analytical use of the database

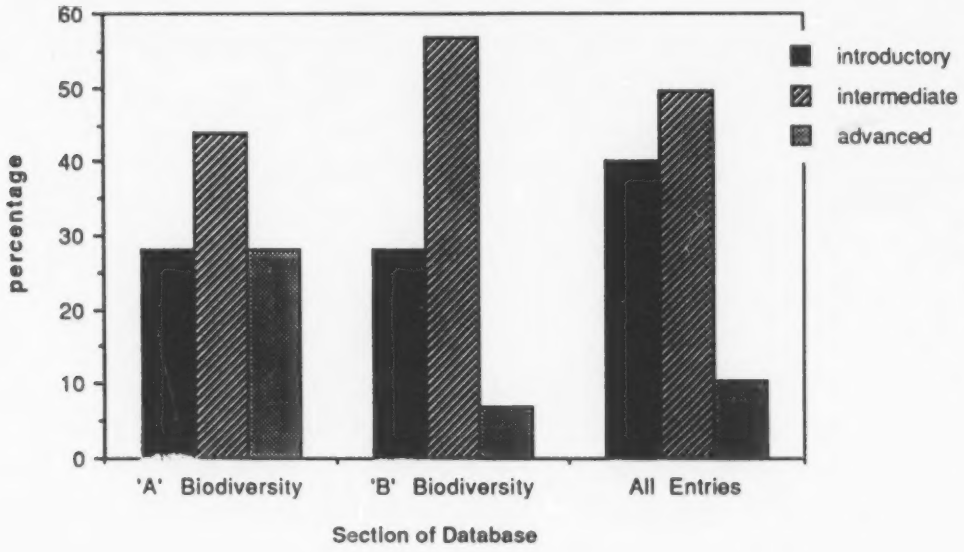
Determining objectives and core entries are instructional tasks that may be conducted with a hard copy of Essential Learnings -- but because Essential Learnings is a database, computer searches of its content offer an additional analytical aid to instructional development.

An instructional problem I encountered while writing a script on biodiversity, could have been anticipated had I used the database to analyze my proposed content. First of all, the database entries selected for the biodiversity module (Appendix D) may be divided into "A" entries, from the pure science sections, and "B" entries, from the human/environment sections. The 18 entries drawn from the "A" section are largely concepts on evolution and genetics, concepts unfamiliar to my script's middle school audience. The difficulty these concepts would pose in script-writing becomes clearer when the level of these "A" and "B" biodiversity entries are compared both with each other, and with the level of the database overall. See Graph 5.

Nearly 30 percent of the "A" entries are advanced, as compared to less than 10% of the "B" management entries, and 10% of the overall entries. Using the database in this way may help the CEETV project to avoid instructional pitfalls. For example, knowing that biodiversity will be a difficult idea for the students, the series can lead up to it accordingly, or perhaps provide extensive background materials for teachers.

GRAPH 5

Level of All Entries as Compared to Biodiversity Entries



Chapter 5
Conclusions and Recommendations

Conclusions are drawn from Chapter Four's analysis of Essential Learnings' universality and definition of EE. Recommendations follow on the database's value to ongoing and future EE efforts.

Conclusions on Essential Learnings' Definition of EE

Based on the two-pronged (content and process) approach to EE definition outlined in Chapter One, this author concludes that Essential Learnings offers a functional EE definition first in its reliance on the Tblisi definition as its central goal and in its design, and second in its incorporation of the three vectors of EE content: EE's diverse origins, rapid evolution, and differing cultural perceptions. This strength of the database also lies in its cross-cultural origins, the use of pre-established concept bases, the extensive literature survey, and in the review of entries by Indian and American environmental scientists and educators.

The relative completeness and thoroughness of the database substantiates a definition of EE process derived from its educational coding. As presented in Chapter Four, this process definition of EE. is in three parts, (1) educational *objectives*, (2) *levels* and (3) *type of content.*

The Tblisi definition stresses a full spectrum of *objectives* from establishing awareness to active participation. Whether the spectrum is one-sided or evenly spread is not indicated. However, in Graph One on page 53, Essential Learnings says 6% of the entries are participatory, 24% attitude, 26% awareness, and 44% knowledge. Rather than taking this as an indication that awareness far

supplants participation in importance in EE, the low percentage of participation entries may be explained in part by the database's anticipated role in instructional development. It is not a cook book of learning objectives. Essential Learnings is a source from which objectives and curricula will be developed. Therefore, it is very likely that many of the 44 percent of the entries coded as knowledge, will be translated into both cognitive and affective behavioral objectives which employ discovery and participation methods.

EE is a life-long process -- from Kindergarten to post-doctoral. Therefore, it would be expected that a core of EE learnings would be accessible to younger learners at an introductory *level*. Graph 2 on page 54 upholds this expectation; 90 percent of the learnings are at either a primary or a secondary level. It suggests that many EE concepts are basic, and as such, they may be integrated within curricula across the board. This is encouraging because while the database was targeted at the middle grades, it can readily serve as a starting point to build instruction at all levels.

Regarding *type of content*, Graph 3 on page 55 shows that 55 percent of Essential Learnings is *fact*, 28 percent *opinion*, 15 percent *issue*, and 3 percent *data*. The 58 percent fact and data attests to the rooting of EE in established domains (as Townsend found, these domains were ecology, culture, ethics, natural resource management, and population). At the same time, the 43 percent of material that is issue and opinion affirms that EE is an educational process that encourages the discussion of issues and alternatives. We may view these facts as part of the primary sources of EE content, while the issues and opinion are derived from the segment of EE content that changes as our ethics and our society change.

Further, as with the objectives, the number of entries which are fact may be a deliberate outcome of developing a database that may be required to stand alone. For example in the hands of an individual teacher with limited access to support materials, it needs to be heavy in fact and data.

Conclusions on Essential Learnings' Universality

Just as Essential Learnings provides a basis for EE process definition, it provides a foundation which has been analyzed for universality. The following criteria were established in Chapter Two for universality: EE content must be relevant across cultures, and flexible in its use as a change agent (i.e., in the degree and type of participation expected from a targeted audience). In addition universal EE must be flexible in its adaptation to educational technologies.

Chapter Four explained the cross-cultural value of the database by division of content into *Indian*, *Developing World*, and *Universal* categories. Categorization was largely self-evident and based on my cross-cultural experience and extensive review of contemporary EE literature. This thesis concludes that the database, designed for a specific EE project between the US and India, has resulted in EE content that is 89% relevant across cultures. Only 6 percent of the entries were defined as culturally limited to India, and an additional 5.4 percent as culturally limited to the Developing World, leaving 89 percent of the database as universal. This was not expected. Recommendations below include further comment on what this means to on-going and future EE efforts.

The other universal aspects of the database relate to the process of instructional design. It is concluded that Essential

Learnings is fully universal for its flexibility in EE's role as a change agent. This is based on the database's entry codes, which allow the tailoring of database entries to meet specific audience needs. Chapter Four described instructional development's role in implementation of Essential Learnings' universality, suggesting how it may be used in identifying themes and in writing objectives, lesson plans and student learning activities.

Essential Learnings is also universal in is ability to be used for development of various media products. In Chapter Two television's importance in continuing the tradition of visual orality in India was noted. The database is currently being used to develop television lessons. It can as easily be used when producing instructional materials for radio, filmstrip, and other print and non-print media.

The final conclusion must await further experience in use of the database. But so far it can be said that the Essential Learnings database is serving its intended purposes for use in instructional design, development and evaluation in a culture-specific EE project.

Recommendations

As suggested by McCrea and Wood, caution should be observed in the transfer of EE between countries. The unexpected universality of this database does not mean that it should be line-by-line adopted for use in other countries and projects -- rather it should be adapted. The database has been specifically edited for in-India use. Differences in perception of environmental problems, and in nations' and citizen's abilities to address these problems prohibit verbatim use of the database outside of India. Some screening, some revision, some additions and deletions should be made for use of the database in other countries.

However, the universality of the document does warrant publishing the database and making it widely available in hardcopy and on disc. A government of Malawi environmental educator has drafted a version of the database which is currently being reviewed in Malawi for use in developing a national EE curriculum. Essential Learnings is also being reviewed by US AID for possible use in other Asia NearEast countries.

While I believe that experience to date warrants recommending use of Essential Learnings as a starting point and a framework from which EE programs may be developed, it is not intended to be a blueprint. It is not exhaustive or without errors. Further, EE must be in constant flux to remain relevant to changing issues in a changing world.

I suggest that the database's flexibility in change agent role makes it valuable in both formal and non-formal education.

The classification of its learnings by levels makes its content adaptable for all age groups, including adults.

As analyzed earlier, universal entries omitted the concerns uniquely tied to the developing world. However, I recommend that these issues be taught to Developed World high school, college and adult audiences to broaden their human and environmental world views.

The database's value to instructional development can only be proved following feedback from instructional use. However, based on Chapter Four, I offer these recommendations:

There are certain theme or core learnings which transcend topics. (See Chapter Four.) In its current version there is no coding system to identify such entries which apply across topics. I recommend that subsequent editions include a new coding system to identify these core learnings.

Developing a vibrant EE program cannot be mechanical. There must always be room for new ideas and original thought. While the database itself should be a tool, I recommend using the database's

list of categories (Diagram 5) as a comprehensive overview framework for initial brainstorming.

I suggest using the database as an analytical tool to anticipate instructional "hotspots," areas that will be difficult for the students to grasp. For example, in the CEETV project, level charts such as the ones developed for biodiversity, could be used to determine the amount of support material required for a module.

Reviewing the scant number of entries coded participatory, and considering the volume of entries coded fact, I suggest educators balance fact/data use with issue/opinion and also make an effort to write participatory objectives from non-participatory entries.

Finally, I suggest that Essential Learnings is never a completed document. It should be revised based on the experience of users and as environmental concerns and knowledge change.

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Appendix A Project Overview

With the launching of a national communications satellite in 1982, 70 percent of India's population came in range of TV signals. This event was paired with massive expansion of an on-the-ground transmission network and greater availability of TV sets. By 1986, through expansion of community viewing sets, and an increased number of sets in private homes, seven percent of Indians had access to television.[1]

At the same time, all of India's 750 million people have a degree of access to India's natural resources, a resource base that is rapidly shrinking. Communication advance arrives in the face of this increasing environmental demand and strain.

The footrace between educational possibilities of newly on-line mass communication, and pressures eroding India's environment gave rise to the The Children's Environmental Education Television Project (CEETV) project. The project was initiated by the Indian government because, 1.) It sees environmental education as the best means to stem many of its environmental problems and, 2.) TV access and its use as a unifying educational tool is a high government priority.

Many in India see television as the launch pad that will take village India into the Information Age. The SITE experiment discussed in Chapter Two was a great success both as an exercise in gaining expertise in TV satellite hardware and in producing educational television. Yet as TV hardware in India races ahead, however, educational software has lagged behind. In their 1985 report, The Working Group on Software for Doordarshan laments

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[1] CEETV annual report p. 10. Although seven percent of the population may seem a small audience, this does represent approximately 52 million people. This seven percent also represents a 1000 percent increase in TV access during the decade 1976-86. Between the impetus of the Indian government and the buying power of the middle class, continued significant increases in TV audience size are expected.

the paucity and weakness of existing educational programming, particularly for woman and children. Pointing to the profusion of dramas and films, they ask if the national priority is broadcasting to satisfy the entertainment appetite of the middle class.[2] It is intended that the CEETV programs will be accepted by the national network for broadcast, fulfilling some of these expressed educational needs.

The project goal is to use television to reach Indian middle school children in the 10-14 year age group who are in the process of forming life-long attitudes and behaviors. The project will present information about their environment, while creating an awareness and a commitment in them to seek solutions to its problems.

This goal is being achieved through the production of a series of environmental education modules for Indian middle school children. Each module will include a half-hour television program and teacher/student print materials. The print materials will complement the theme set by the video, and include background information for the teacher plus suggested lesson plans and activities for the students. Teacher-training is another important facet of the project.

Project Institutions and mechanisms

CEETV is a three-year venture between the State University of New York, College of Environmental Science and Forestry (SUNY/CESF) in Syracuse, NY and the Centre for Environment Education in Ahmedabad, India (CEE). After two years of planning and funding approval, the project was launched in January, 1987.

CEETV is primarily funded by the US Fish and Wildlife Service (FWS) and the Government of India Department of Environment and Forests (DOE). Additional funding is provided by the US Agency for International Development (USAID). The project

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2 Doordarshan. Chapters 9 and 10.

is administered through the International Affairs Office of FWS in Washington, DC, and in turn the Science Office of the US Embassy in New Delhi. The project is divided into two phases, the experimental Phase One, in which the first two modules are produced and evaluated, and Phase Two in which the bulk of the modules are produced and evaluated. The first phase of the project, with which this thesis is associated, is now drawing to a close (September, 1988).

The Centre for Environment Education (CEE) is a national institute established in 1984 to increase environmental awareness among the Indian public. It functions as part of the non-profit Nehru Foundation for Development, and as part of the Government Department of Environment, Forests, and Wildlife. The Centre develops school programs, interpretive and exhibit programs, rural and urban programs, and training programs, as well as operating a nature discovery centre, and a weekly environmental news and feature service for newspapers around the country.[3] Although an early goal of the Nehru Foundation was to educate through film and video, CEETV is the Foundation's first major project utilizing these media.

Some aspects of the project, such as teacher-training in environmental education (EE), and dissemination of the modules, is being integrated within CEE's existing network of non-government organizations (NGOs) and schools. This network was established to support CEE's active involvement in the Government of India's annual National Environmental Awareness Campaign (NEAC). NEAC develops EE materials around a central theme -- then distributes them in workshops conducted throughout India. CEE's NEAC network will become a conduit for the CEETV modules; these two ventures are being logistically and thematically tied. This year the first module for CEETV is also the theme of CEE's 1988 NEAC campaign.

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[3] Sarabhai, p. 4.

By utilizing a network of NGOs and teachers, many of whom are now in their third year of participation, CEETV is strengthening a growing corps of environmental educators. The project recognizes the opportunity to use channels other than the classroom for dissemination of the modules. These include:

a. broadcast on the national television network, Doordarshan.
b. commercial videotape rentals.
c. use in other projects concerned with global environmental efforts.
d. distribution/broadcast in other countries.[4]

During the developmental-evaluation phase, the programs will not be broadcast. However, after the modules are field-tested and revised, they will be available for mass distribution through India's rapidly developing television facilities. Currently most schools do not have television sets and, most teachers are unfamiliar with EE approaches. It is expected, however, that after introduction of the series through the CEE network, and with increasing TV access, the programs will be broadcast regionally and nationally.

My role in the project

Another aspect of the project is the graduate student exchange between CESF and CEE. All US and CEE candidates for the Master's degrees in Environmental Science first complete a year of course work at CESF, followed by at least six months of project work at CEE. The work at CEE may be as an internship, or the basis for a thesis. As of September, 1988, the first US graduate student, this author, completed coursework and work at CEE, while three CEE staffers and a second US student have just gone to India following a year in Syracuse. The third US graduate student has begun coursework at CESF.

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[4] CEETV. "Approaches to our Series," Session 1, speaker Kartikeya Sarabhai.

APPENDIX B

ESSENTIAL LEARNINGS DATABASE

Refer to SE 051 402 for this Appendix.

APPENDIX C

INDIA-SPECIFIC AND DEVELOPING WORLD-SPECIFIC ESSENTIAL LEARNING ENTRIES

INDIA-SPECIFIC ENTRIES

(applicable to many developing world audiences?)

138 The MONSOON refers to a wind system that influences the climatic regime of large regions and that reverses seasonally; specifically the Asian monsoon that produces dry winter and wet summer seasons in India and southern Asia.
Primary Code A5.2 *intermediate*

272 The biodiversity of India is rapidly decreasing through deforestation, improper agricultural practices, pollution and other human-caused factors.
Primary Code B2.2 *introductory*

274 It is estimated that about 4 to 5 percent of all known plant and animal species on earth are found in India. Today a significant portion of the 15,000 plant species and 75,000 animal species found in India are threatened by the pressure of human activity on land and forests.
Primary Code B2.2 *introductory*

276 The present day concern over preserving genetic resources in biosphere reserves is similar to the "sacred grove" concept. These religious reserves conserve examples of biological communities within areas that have otherwise lost this diversity.
Primary Code B2.2 *intermediate*

305 Indian forests are under heavy pressure. With less than intermediate percent of the global forest area, the forests of India are expected to provide for 15 percent of the global human population, and about 15 percent of the global cattle population.
Primary Code B2.5 *intermediate*

308 Reforestation is of vital importance in India. But reforestation efforts are hampered by such factors as the premature cutting or grazing of new plantings.
Primary Code B2.5 *intermediate*

312 Tribal communities in India have a close harmonious relationship with forests. The forests are a part of their cultural and social fabric. Most of their foods, medicines, and other materials come directly from the forest.
Primary Code B2.5 *introductory*

313 The development of tribals and the development of forests are inseparable. Management of forests should be such that it creates confidence among the tribals and gives them a sense of involvement.
Primary Code B2.5 *intermediate*

330 India has a fascinating and rich wildlife heritage. In India there are 350 species of mammals, 1200 species of birds, and well over 20,000 known species of insects. Of these 66 species of mammals, 38 species of birds, and 18 species of reptiles and amphibians are listed on the 1972 Schedule introductory of the Wildlife Protection Act.
Primary Code B2.6 *introductory*

331 Habitat destruction, pollution of air and water, and the increasing drainage of wetlands have taken a heavy toll of bird life in India.
Primary Code B2.6 *introductory*

341 The Himalayan region has paid heavily for India's mistakes in land management. Pressure of agriculture on steep slopes, deforestation and mining have led to the erosion and degradation of the Himalayan environment.
Primary Code B2.7 *intermediate*

(applicable to many developing world audiences?)
343 Landlessness is the cause of many urban migrations. The number of rural landless in India is expected to reach 44 million by the end of the century.
Primary Code B2.7 *introductory*

374 Water in India is intensively used. The non-monsoon waters of Ganga are used several times over during its flow from its source to the sea.
Primary Code B2.8 *introductory*

375 India is using only a tenth of the rainfall it receives annually and even 40 years from now, will be using only a quarter. Rain water should be collected and stored well, without polluting it, to prevent serious water shortages.
Primary Code B2.8 *introductory*

384 In India more than 64 percent of all the energy input in farming originates in animal sources. Besides cultivation the farmer uses animal energy for drawing his cart, irrigation, oil extraction and threshing.
Primary Code B2.9 *introductory*

388 Presently nearly 40 percent of India's total energy requirements are met from non-commercial sources like firewood, agricultural waste, cowdung, animal power and manual labour.
Primary Code B2.9 *introductory*

389 Fuelwood contributes about 10 percent of the total energy consumed in the world. In India this figure is very high. Fuelwood and charcoal are not only the basic needs of any rural household, but are also needed for meeting the energy requirements of a number of industries.
Primary Code B2.9 *introductory*

407 Forty five percent of India's electricity comes from hydropower, and forty five percent from thermal power (mainly coal). The rest is from a combination of oil, natural gas, and diesel. Seventy percent of this electricity is consumed by the industrial sector. *Primary Code B2.9* *introductory*

(applicable to many developing world audiences?)

427 Traditionally agriculture in India was labour-intensive, used organic fertilizers, and was ecologically sustainable.
Primary Code B3.1 *intermediate*

430 Agricultural research in India should emphasize low-cost techniques for those farmers where rainfall is erratic or soils are poor. Alternative systems of irrigation, for example, include the Israeli trickle or drip system used in some parts of India, which is efficient despite its limited use of water.
Primary Code B3.1 *intermediate*

432 Excess of grazing animals, dwindling grazing lands, and lack of organized fodder production and pasture management has led to over-grazing. Only about 13 million hectares in India are classified as grazing lands, of which half is being over-grazed.
Primary Code B3.1 *intermediate*

436 The work animal fits organically into the rural scene and ecological system. The feed for the animals comes mainly from the village pasture and is derived from fodder and hay from the farmers' own crops. Animal dung is used as farm manure and as fuel in the home.
Primary Code B3.1 *introductory*

447 Lack of watershed management has shortened the life-span of most hydroelectrical projects in India as silt is rapidly filling in the reservoirs. Small scale hydroelectric projects where the entire watershed can be managed may be the best alternative.
Primary Code B3.3 *intermediate*

451 In India solar energy is used for the production of salt, and to a lesser extent in cooking. Some villages are now converting solar energy to electricity.
Primary Code B3.3 *introductory*

527 The rate of urbanization is rapidly increasing in India. Housing, water supply, waste disposal, and sewage treatment facilities have not kept pace. This has led to polluted, over-crowded living conditions for many who move to the city. In India more than half of the urban households occupy a single room, with an average occupancy per room of 4.4 persons.
Primary Code B5.1 *intermediate*

528 India's population is predominantly rural with only 24% of her 765 million people living in cities.
Primary Code B5.1 *introductory*

529 A major environmental service is rendered in the cities by those people who recycle and dispose of our wastes.
Primary Code B5.1 *introductory*

540 The Indian tradition teaches us that all forms of life -- human, animal and plant -- are sacred, and so closely linked that disturbance in one gives rise to imbalance in the other. Conservation is a rediscovery of this attitude.
Primary Code B6.1 *Introductory*

541 Funerals, weddings and feasts can consume huge amounts of wood. In India, up to 400 kg may be used to cremate a single body. In Gujarat, the forest department is giving villages improved crematoria that reduce consumption by 25 to 50 percent, thus helping people save both money and trees.
Primary Code B6.1 *Introductory*

545 'Dharma', the Indian concept of religion, is a code of conduct for organizing lifestyles so they are harmonious with both other people and with the environment.
Primary Code B6.1 *Intermediate*

546 Apart from the Vedic, Upanishadic and Pauranic concepts of human dependence on nature, which were partly religious and spiritual, and partly aesthetic and ethical, Buddhist, Jain and Hindu philosophers made explicit efforts to understand nature and relate it to human well-being.
Primary Code B6.1 *Intermediate*

547 Hinduism states that the natural environment is a manifestation of divine nature itself. The order of creation was Akasa/Space, Vayu/Air, Teja/Energy, Apa/Water and Prithvi/Earth. These were known as the Panchatattva.
Primary Code B6.1 *Introductory*

556 Some species in India are considered sacred which has led to their protection and preservation. Some examples include, the sal, the bilva (Shiva's tree), the lotus, the Ficus tree and the Hanuman langur.
Primary Code B6.1 *Introductory*

(Also applicable to some other Asian audiences)
548 Buddhism, through its cardinal principles of simplicity and non-violence has encouraged respect of ecological management and rational use of natural resources for satisfying man's material needs.
Primary Code B6.1 *Introductory*

(Also applicable to some other Asian audiences)
549 Buddhists stress the relationships between humans and trees. They suggest planting a tree every few years and then keeping watch over it, to foster a personal relationship between the tree and the human.
Primary Code B6.1 *Introductory*

550 Jains lay the greatest emphasis on respecting the harmony between man and nature emphasizing the minimum destruction of resources, living and non-living, to satisfy human needs.
Primary Code B6.1 *Introductory*

551 Sikhism stresses use of resources for food and nutrition and promotes the development of partnership and community life.
Primary Code B6.1 *Introductory*

552 Islam stresses that God has full ownership of the land and that men are only trustees. The right to ownership of land which has been improved from a barren status to productive is stressed. A special emphasis placed on the protection of fruit-bearing trees.
Primary Code B6.1 *introductory*

553 Zoroastrians believe that creation continues to progress towards perfection. Fire is valued above other aspects of nature, and water is valued over other resources -- it is considered desecration to place a corpse in water.
Primary Code B6.1 *introductory*

554 Ancient Dravidian civilisation realised the unity and evolutionary nature of life. They attached reverence to plants, and had great respect for ecological balance.
Primary Code B6.1 *introductory*

(applicable to Africa-- remove)
555 Sacred groves (or lakes and rivers) are conferred protection under religious sanction. Such protection of entire biological communities has conserved biodiversity that otherwise has been lost in the some regions.
Primary Code B6.1 *intermediate*

557 In some instances religion has inspired environmental protection. The Bishnoi community in Rajasthan and Haryana founded around 1485 A.D. instructs the followers never to cut a green tree or kill an animal. About 350 years ago, 363 Bishnois (including women and children) laid down their lives to prevent the local king from cutting down trees in their area. The tradition of preservation has continued, and even now the Bishnoi villages are a refreshing scene of greenery and wildlife in the Indian desert.
Primary Code B6.1 *introductory*

572 India is one of the few countries of the world whose Constitution makes specific references to the need for nature and wildlife conservation.
Primary Code B6.2 *introductory*

573 India was one of the first countries to have launched social forestry. In 1950, the festival of tree planting, Vanamahotsava, was instituted by the government as an annual feature. Gujarat was the first state in India to implement it.
Primary Code B6.2 *introductory*

574 At present India has 53 National Parks and 247 Sanctuaries under the Wild Life (Protection) Act, 1972. The total area covered by these national parks and sanctuaries is about 10,000 sq. kms.; which is roughly 3% of the total land area and about 12% of the total forest area of the country.
Primary Code B6.2 *introductory*

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38 entries

DEVELOPING WORLD ENTRIES

113 In tropical countries, bare soil which is exposed to the sun for extended periods, heavy rainfall and erosion can turn into LATERITE, a rock-like earth covering that is poor for agriculture.
A3.4 *intermediate*

138 The MONSOON refers to a wind system that influences the climatic regime of large regions and that reverses seasonally; specifically the Asian monsoon that produces dry winter and wet summer seasons in India and southern Asia.
A5.2 *intermediate*

306 Successful community forestry requires that foresters help people plant trees around their homes, farms and villages, along canals and roadsides. It also requires genuine popular participation in decision-making,where to plant, what species to plant, for what purposes, how to harvest and distribute the produce.
B2.5 *intermediate*

307 AGROFORESTRY means growing trees in close association with crops, either in rotation with them or interspersed among them.
B2.5 *introductory*

309 Eucalypts (trees of the genus Eucalyptus) are one of the best known and most versatile groups of tree species. There are roughly 500 known species, adapted to a broad range of soil and climatic conditions. Eucalypts have been introduced all over the world -- some at high altitudes where few other trees can survive, some in near deserts.
B2.5 *intermediate*

310 The extensive use of eucalyptus trees in reforestation programmes has raised many issues: Their growth in low nutrient and water poor soils to provide a dependable cash crop has met with success. Yet their depletion of soil nutrients and heavy water consumption, and failure to provide fuel and fodder, has met with criticism. Others criticize the MONOCULTURE (or tracts of a single species) planting of eucalyptus, saying that it may be vulnerable to new pests or diseases, and supports little other life. *B2.5* *intermediate*

311 Trees traditionally used for a variety of purposes best adapted to habitat should be preferred over exotic species in social forestry schemes.
B2.5 *intermediate*

328 Maintaining a buffer zone around a national park for sustainable use by local people is an important wildlife management tool.
B2.6 *intermediate*

338 DESERTIFICATION is the irreversible change of fertile land into wasteland. In extreme cases, the loss of topsoil and vegetation leads to a total destruction of the land's life supporting ability. Desertification threatens over 600 million people, and over 35 percent of land in the world. It is caused by climatic changes and human disruption of ecosystems.
B2.7 *intermediate*

339 Desertification can be ameliorated through afforestation and agroforestry, using suitable plant species, soil conservation, and water management.
B2.7 *intermediate*

343 Landlessness is the cause of many urban migrations. The number of rural landless in India is expected to reach 44 million by the end of the century.
B2.7 *introductory*

389 Fuelwood contributes about 10 percent of the total energy consumed in the world. In India this figure is very high. Fuelwood and charcoal are not only the basic needs of any rural household, but are also needed for meeting the energy requirements of a number of industries.
B2.9 *introductory*

390 In many developing nations, over 90 percent of domestic energy is supplied by wood. By the year intermediate000, some intermediate.4 billion rural people will be using fuelwood faster than it is being replenished. Creating fuelwood plantations on marginal land is one approach to meeting fuelwood demands.
B2.9 intermediate

424 Loss of agricultural produce to pests and microorganisms is significant. It is estimated that rodents alone cause losses up to 10% of harvested grain in the developing countries.
B3.1 *introductory*

425 Reduced crop yields in arid and semi-arid areas is one reason many small farmers have abandoned cultivation.
B3.1 *introductory*

426 Traditional agricultural practices, such as intercropping, are ecologically sustainable practices because they mimic ecosystem processes. However, practices such as shifting agriculture (slash and burn) are now less sustainable as they require large amounts of land. While suitable for small isolated populations, today overpopulation pushes farmers to return quickly to abandoned fields, resulting in environmental deterioration.
B3.1 *intermediate*

428 Marginal farms can be improved through REGENERATIVE FARMING techniques. INTERCROPPING (planting crops together which require different nutrients) fully utilizes the soil. CROP ROTATION between grains (which use nitrogen) and legumes (which replace it), restores the nutrients. AGROFORESTRY, the planting of trees and shrubs amongst crops, utilizes those nutrients deeper in the soil, that are not available to shallow-rooted crops. An added benefit, regenerative farming requires less chemical fertilizers and pesticides to produce the same yields. Drawbacks are these methods are labour-intensive, and often unfamiliar to local farmers.
B3.1 *intermediate*

433 In many areas, livestock and fodder gathering cause more damage to woodlands than the cutting of fuelwood.
B3.1 *introductory*

434 Overgrazing by cattle and other animals destroys plant cover and leads to soil erosion. Stall-feeding, and fencing fragile areas are two approaches to this problem.
B3.1 *Introductory*

443 Often production waste in one industry can be the starting raw material for another. Many wastes have marginal quantities of useful and even costly materials. For example, sawdust may be used to make paper board.
B3.2 *Introductory*

489 Day-to-day living has some health hazards. Cooking utensils should not react with the food being prepared. Packing of foods should not allow spoilage which, when it occurs, leads to food poisoning. Similarly drugs should be packaged well, and not sold after expiring.B4.1 *Introductory*

493 Human waste should ideally be treated before being returned to the environment because of the likelihood of spreading disease. When defecation is done in the open, the waste should be covered with soil.
B4.1 *Introductory*

494 Women cooking indoors over wood and charcoal fires inhale carcinogens equivalent to those inhaled by heavy cigarette smokers. Use of smokeless stoves; stoves with chimneys that let the smoke out of the house, help reduce this problem.
B4.1 *Introductory*

522 Migration into urban settlements will continue as long as people cannot meet their needs in their rural homes and believe that the city offers more.
B5.1 *Introductory*

526 Once people migrate from their villages to the city, it is seldom feasible to force them to return to their village when their land ties have been lost. Long-term development planning, such as increasing employment in the rural hinterland, is one viable alternative.
B5.1 *advanced*

544 Often cultural practices sanctified by religion put restraints on the utilization of plant and animal species and so promote their conservation. Such practices include taboos on the killing of certain sacred species, closed seasons for hunting, and sacred groves, lakes, rivers, etc.
B6.1 *Introductory*

592 Women often have different attitudes than men about tree growing. As the main gatherers and users of forest products, they may be more aware of emerging scarcities and more receptive to planting efforts. Also, women sometimes have specialised knowledge of local tree and plant species that could be of great value to foresters.This is specially true in developing nations.
B6.4 *Introductory*

593 In most countries it is the women, helped by children, who are responsible for fuel collection. Thus not surprisingly, in some areas men seem unconcerned about fuel scarcity problems and indifferent to suggestions that they should plant trees.
B6.4 *Introductory*

594 Laws protecting resources should not be laws which deprive the poor of resources. People dependent on forests must be given dependable alternative sources when their traditional resources become protected areas.
B6.4 *introductory*

595 Those who are poor and hungry will often destroy their immediate environment in order to survive; they will cut down the forests, overgraze their livestock, overuse marginal lands, and in growing numbers crowd into congested areas.
B6.4 *introductory*

596 The livelihood and hopes of the poor are the first casualties of a degraded environment.
B6.4 *intermediate*

597 The poor suffer the most from a degraded environment. When water-borne diseases strike, it is usually in the slums. When factories spew poisonous gases into the air, it is the workers in nearby housing colonies who are most affected. When a well goes dry, it is the poor who must trek ever-increasing distances for water.
B6.4 *introductory*

622 Parks and Nature Reserves must be established with regard to local cultural values, fears, and needs. Parks should not be an island fortress. With limited funds and staff, it is difficult to protect a reserve from surrounding human pressures, unless these peoples needs have been incorporated into the park structure. Education about the park and provision of a usable buffer zone are actions which will strengthen local support of the park. Local expertise on the ecology, wildlife, and uses of area plants could be incorporated into the park structure.
B6.6 *intermediate*

623 Forest officers must become educators and community organisers rather than policemen. The need is for 'barefoot foresters' - men and women who may have less scientific training but who are willing to undertake work in remote rural areas. More female foresters who can reach women and involve them in solutions to the fuelwood problem are also essential.
Primary Code B6.6 *introductory*

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34 entries

APPENDIX D BIODIVERSITY ENTRIES

from Essential Learnings sections other than biodiversity

(see Appendix B for entries in the biodiversity sections of database)

√ = Core Concepts applicable to all modules

2 6 *intermediate* The stability of ecosystems may be disrupted by natural (fires, floods) and man-made (urbanization, pollution) factors. A large disturbance (a dynamite explosion or a volcanic eruption) may destroy an entire ecosystem. *Section of Handbook A1.0*

9 4 *intermediate* Tropical rain forests with their rich variety of vegetation and animal life are a climax community resulting from an extensive development period. With an annual rainfall of about 2000-4000 mm.and high humidity, these forests are valuable for their timber and other useful products. Today they are being destroyed at an alarming rate. These forests are slow to regenerate once they are destroyed. *Section of Handbook A3.2*

9 5 *intermediate* Mangroves dominate about 75 percent of the earth's tropical coastline where rivers flow to the ocean. They harbour a unique flora and diverse fauna. They protect the coastline, prevent erosion, and are nurseries for many organisms. Mangroves provide habitat for many rare species such as the estuarine crocodile. They are also a source of fuel and fodder. *Section of Handbook A3.2*

9 6 *introductory* Grasslands are characterised by plains with dense grasses, sparsely distributed trees and sometimes an abundance of herbs. India does not have climax grasslands like the prairies, steppes, savannahs and pampas of North America, Australia and Africa. Grasslands are an ideal habitat for a rich variety of fauna. *Section of Handbook A3.2*

1 1 3 *intermediate* In tropical countries, bare soil which is exposed to the sun for extended periods, heavy rainfall and erosion can turn into LATERITE, a rock-like earth covering that is poor for agriculture.*Section of Handbook A3.4*

1 2 4 *introductory* Floods, landslides, drought, fire and tidal waves are natural phenomena. However their magnitude and frequency depends on human interaction with the environment. *Section of Handbook A5.0*

2 0 7 *intermediate* Diversity within a habitat leads to niche diversity. For example, a habitat with wet and dry zones will have more types of plants and animals than a habitat that is just wet or just dry. *Section of Handbook A5.7*

√2 1 9 *intermediate* We think of the biosphere as a source when it is a cycle. We alter it rather than integrating with it. We think of it in terms of our needs, rather than of the needs of all life forms. But we are members of the biosphere, not its consumers. *Section of Handbook B 1.0*

2 2 3 *Introductory* Animals and plants are important to us in that they furnish food, clothing, transportation, housing, and medicines. *Section of Handbook B1.1*

2 3 1 *Intermediate* Our greatest impact on the environment is the destroying or altering of habitat. *Section of Handbook B1.2*

2 3 4 *Intermediate* Individually and collectively people are capable of significantly altering cycles and systems of the earth. For example, deforestation throughout the world is believed to have affected climatic patterns. *Section of Handbook B1.2*

√2 3 6 *Introductory* Our lifestyle can affect the environment in significant ways. Highly consumptive lifestyles have great impact on the environment through their extensive use of resources. Similarly simple lifestyles, such as that of herdsmen, can effect the local environment (ie when their flock overgrazes). *Section of Handbook B1.2*

√240 *Introductory* Man is capable of reducing and reversing his negative impact on the environment because he can think, plan, and educate. *Section of Handbook B1.2*

√247 *Intermediate* Natural resources occur or develop in keeping with natural laws. They renew over infinitely long period of time. For example, millions of years for minerals, hundreds of years for soil and tens of years for vegetation. *Section of Handbook B2.0*

√2 5 8 *Introductory* The biosphere is capable of providing an acceptable quality of life for all people if resources are wisely conserved and fairly distributed. *Section of Handbook B2.1*

3 3 0 *Introductory* India has a fascinating and rich wildlife heritage. In India there are 350 species of mammals, 1200 species of birds, and well over 20,000 known species of insects. Of these 66 species of mammals, 38 species of birds, and 18 species of reptiles and amphibians are listed on the 1972 Schedule 1 of the Wildlife Protection Act. *Section of Handbook B2.6*

√335 *Introductory* The most profitable use of the land is not always necessarily the best use in terms of its health and ecology. For example, limestone quarrying in the Doon valley has lead to considerable destruction of regional ecosystems. *Section of Handbook B2.7*

3 5 1 *Introductory* CORAL REEFS are areas of high productivity and diversity of species. One-third of all fish species in some way depend on coral reefs. Reefs are also crucial for protection of coasts against erosion. Sediment pollution (silt), and destruction by blast fishing and mining are the main threat to this ecosystem. Water pollution, over-fishing, and other factors are also contributing to this ecosystem's decline. *Section of Handbook B2.8*

3 5 3 *Introductory* ESTUARIES are indented portions of coast where rivers meet the sea. Their mixture of fresh and salt water supports diverse marine, estuarine, and freshwater life. *Section of Handbook B2.8*

413 *Intermediate* Technological development has accelerated changes in the environment and has led to the exploitation of environments previously not affected, such as deserts, swamps, polar icecaps, the sea-bed, the rainforest, etc. *Section of Handbook B3.0*

423 *Intermediate* Gene banks of traditional and wild varieties of crops are essential to maintaining plant productivity. *Section of Handbook B3.1*

√241 *Introductory* Humans have the ability to change their environment and collectively these changes influence the biosphere for good or for bad. What life is like on earth in the future depends on how we collectively take care of it now. We should all strive to be good "caretakers" of the earth. *Section of Handbook B1.2*

√453 *Introductory* The lives of future generations depend on our use of resources today. *Section of Handbook B3.4*

√456 *Intermediate* The thresholds of natural systems are not well understood, and the consequences of crossing them are not known. Moreover, threshold effects are now appearing in some natural systems (acidification of forests and soil in Europe, reoccurring droughts). *Section of Handbook B3.4*

√496 *Intermediate* Overpopulation and overconsumption are the root of most environmental problems. Among other things, they lead to human suffering and reduce the quality of life. *Section of Handbook B5.0*

√540 *Introductory* The Indian tradition teaches us that all forms of life -- human, animal and plant -- are sacred, and so closely linked that disturbance in one gives rise to imbalance in the other. Conservation is a rediscovery of this attitude. *Section of Handbook B6.1*

574 *Introductory* At present India has 53 National Parks and 247 Sanctuaries under the Wild Life (Protection) Act, 197intermediate. The total area covered by these national parks and sancturies is about 10,000 sq. kms.; which is roughly 3% of the total land area and about 12% of the total forest area of the country. *Section of Handbook B6.2*

√585*Intermediate* Environmental problems may be defined witihin an economic context. In the West they are often associated with protecting endangered species and wilderness, for the sake of aesthetics and recreation value. In India, however, conserving the resource base is a matter of survival for the millions of rural poor who depend on the environment for their sustenance. *Section of Handbook B6.3*

√603 *Intermediate* We are ethically responsible to other individuals and society, and to that larger community, the biosphere. *Section of Handbook B6.5*

√612 *Introductory* To inculcate in our children a sense of their rich environmental heritage, which they must help to preserve, is usually more effective than only prohibiting poaching, felling of trees, pollution etc. *Section of Handbook B6.6*